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The Committee made no statement.

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BRIEF DESCRIPTION:

In a vast natural forest in Wyoming, Yellowstone National Park covers more than 9,000 square kilometres. An impressive collection of geothermal phenomena can be observed there, including more than 3,000 geysers, fumaroles and hot springs. Established in 1872, Yellowstone is equally known for its wildlife, such as grizzly bears, wolves, bison and wapiti.

1.b. State, province or region: The Park occupies the northwest corner of the State of Wyoming and relatively small adjacent areas of the States of Montana and Idaho

1.d Exact location: Long. 109°10' - 111°10' W / Lat. 44°08' - 45°07' N

Introduction

Yellowstone National Park stands as a pre-eminent leader of perhaps the proudest parade mankind has yet set in motion—the parade of national parks and reserves that began in the United States nearly 106 years ago and marched around the world.

As a living, evolving record of vulcanism, with continuous roots going back into Eocene time, Yellowstone is outstanding. Its most spectacular mountains are ancient volcanic remnants; its hot springs and geysers are the world's largest. The most extensive recognized caldera on Earth—100 times the size of Krakatoa's—comprises half the park. Twenty-seven successive fossil forests, buried by a series of volcanic ash falls over 50 million years ago, contain more than 100 species of ancient trees and shrubs.

As agents for rapid geologic change, the thousands of thermal features (geysers, fumaroles, hot springs, mud pots and spouters) paint a picture of evolution-at-the-gallop, while three major vegetation zones (spruce-fir, lodgepole pine, and Douglas fir-sagebrush-steppe) provide the setting for on-going evolution of some 1,000 species of plants and 57 species of mammals.

Yellowstone's geysers are a spectacular concentration of a rare worldwide phenomenon. More than 2.5 million people visit the park each year, lured by Old Faithful and its hundreds of lesser counterparts. In addition, the superlatively scenic Grand Canyon of the Yellowstone has thrilled viewers and inspired generations of artists and authors to the heights of their respective crafts.

Secluded watersheds and ecosystems provide the necessary context for such rare, threatened, and endangered species as grizzly bear, mountain lion, arctic grayling, bald eagle, and trumpeter swan—even a remnant group of surviving wolves, thus enabling Yellowstone National Park to meet all four criteria for inclusion as a natural area on the World Heritage List.

The first non-Indian name for the area was "Roches Jaunes," which appeared on a map of unknown authorship in 1797 and was translated (by Rene Jessaume for David Thompson in 1798) as "Yellow Stone." The name Roches Jaunes died hard, but Yellowstone finally won.

The National Park idea, begun and perfected in Yellowstone, has served as a model for many United States national parks that followed and for parks and reserves throughout the world. Out of the lessons learned there have come ever-growing park systems, reflecting the deep concern of people everywhere that the grandeurs of nature be protected and preserved for the benefit and enjoyment of themselves and future generations.

Visited only occasionally in the early 19th Century by fur trappers and prospectors, the country of the Yellowstone remained a mysterious place—generating near-incredible tales about boiling fountains, thundering waterfalls, and a great lake where enormous trout might be had in unlimited quantities. Inevitably, the stories led to serious exploration—first by David E. Folsom (1869) and Henry Washburn (1870) and then by the U.S. Geological Survey of the Territories, which 1871 expedition was led by Ferdinand V. Hayden.

A Montana newspaper editor wrote on January 31, 1872, a full month before the Yellowstone Act became law:

"It will be a park worthy of the great republic . . . Should the whole surface of the Earth be gleaned, not another spot of equal dimensions could be found that contains on such a magnificent scale one-half the attractions here grouped together."

In 1872, Congress set aside 2-1/3 million acres (898,349 ha.) as a "public park or pleasuring-ground." President Ulysses S. Grant signed the Yellowstone Act on March 1, 1872. Aubrey Haines, noted in his book, *The Yellowstone Story*, "That legislation completed the evolution of the park idea: from roots in the Saxon concept of holding village lands 'in common,' through economic and philosophical developments of the early 19th Century leading to the scenic cemetery, the landscaped city park, the state park, to arrive at last at the idea of reserving wild lands 'for the benefit and en-

joyment of the people' *under federal management.*" (author's italics).

For the park's semi-centennial, Olin D. Wheeler, in *Western Magazine* (Feb. 1, 1921), confirmed the park's outstanding characteristics. Yellowstone remained, he wrote, "a land of contradictions, a spectacular pageant, a world incomprehensible . . . a wonderful gift to men from a benign God—all this and more."

Rudyard Kipling, in 1899, visited Yellowstone "in the company of an adventurous old lady from Chicago and her husband, who disapproved of the scenery as being 'ongodly.'" For himself, Kipling found Yellowstone National Park:

—intriguing ("I met a stream of iron red hot water, which ducked into a hole like a rabbit; followed a gentle chuckle of laughter, and then a deep exhausted sigh from nowhere in particular;")

—and amusing ("The first mound I encountered belonged to a goblin splashing in his tub. I heard him kick, pull a shower-bath on his shoulders, gasp, crack his joints, and rub himself down with a towel; then he let the water out of the bath, as a thoughtful man should, and it all sank down out of sight till another goblin arrived;")

—and profoundly moving ("Once I saw the dawn break over a lake in Rajputna and the sun set over Oodey Sagar amid a circle of Holman Hunt hills. This time I was watching both performances going on below me—upside down you understand—and the colours were real! The canyon was burning like Troy town; but it would burn forever, and thank goodness, neither pen nor brush could ever portray its splendours adequately.")

It is appropriate that this unparalleled park be included in the front ranks of the world's most significant collection of natural areas. The feat of preservation and perpetuation that is Yellowstone—carved out of the heart of a brawling frontier and held inviolate through a century of the most intensive national development the world has ever known—is quintessential evidence of the strength and dynamism of the National Park and Reserve idea.

Yellowstone remains its prototype and foremost exemplar.

Yellowstone National Park

World Heritage Nomination

I. Location

- A. Yellowstone National Park is located in the United States of America. It occupies the north-west corner of the State of Wyoming and relatively small adjacent areas of the States of Montana and Idaho.
- B. Yellowstone National Park lies N44° 08' and N45° 07', W109° 10' and W111° 10'. The elevation ranges from 1,710 m to 3,463 m.
- C. Yellowstone National Park includes 898,349 ha. of Federal land; 824,463.21 are in Wyoming; 61,143.65 in Montana; and 12,743.02 are in Idaho.

II. Juridical Status

Ownership of the Yellowstone National Park resides in the people of the United States as represented by the U.S. Government. The Yellowstone Act, signed into law by President Ulysses S. Grant on March 1, 1872, provided that the Park "... is hereby reserved and withdrawn from settlement, occupancy or sale ... and dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people." The National Park Service has exclusive jurisdiction and administrative responsibilities over all lands within the borders of the park.

III. Identification

Geology and Physical Description

The park is largely a volcanic plateau of two different geologic ages, with two relatively smaller areas of sedimentary rock. Beginning in early Eocene time, eruptions of molten rock and debris occurred from a line of volcanoes, as well as from isolated vents. The deposits of andesite and debris thrown out by these ancient eruptions form the spectacularly steep and lofty Absaroka Mountains along the park's east boundary. The oldest exposed rocks in Yellowstone National Park date back 2.7 billion years—nearly $\frac{2}{3}$ the life of the planet. The youngest rocks are being formed continuously and are only seconds old.

Contained within the Absaroka volcanics are the remains of 27 forests, each of which was successively buried by eruptions of ash. These living forests were composed predominately of sycamore trees (*Platanus* and *Plantanophyllum*) but they also included walnut (*Juglans*), magnolia (*Magnolia*), chestnuts (*Castanea*), oaks (*Quercus*) and redwoods (*Sequoia*). More than 100 species of plants have been identified, and the majority of the petrified trees are found in their original upright position. Professor Erling Dorf of Princeton University believes this array of 27 fossil forests to be unique.

A quiet period of 25 million years followed the period of active vulcanism, lasting through Oligocene and Miocene times and permitting deep erosion of the region. Broad uplifts of several thousand meters marked the end of this quiet time, when several large-scale normal faults produced the Gallatin and Grand Teton Mountains.

About 600,000 years ago, the volcanic activity reached a climax. It was then, according to the U.S. Geological Survey, that a violent explosion from an underlying magma chamber created the largest caldera, or crater, known to them in the world. It measures approximately 3,110 square kilometers—100 times larger than the 31 square kilometers caldera formed by the explosion of Krakatoa in the East Indies in 1883—and lies roughly in the center of the park. Reaching from the Madison River to the eastern

edge of Yellowstone Lake and from Lewis Lake to the Upper Falls of the Yellowstone River, the enormous area of crustal collapse was not recognized until satellite photographs disclosed its presence.

In Pleistocene times, ice covered most of the park, leaving behind abundant glacial features. Deposits of glacial gravel in Yellowstone's hydrothermal areas are an important factor in the creation of ground water systems for geyser action.

The best-known features of Yellowstone National Park are its geysers and hot springs. Heat from the magma chamber is transmitted by conduction into the solid rock surrounding it, heating the ground water that circulates through layers of rhyolite and glacial gravel. Wherever no constrictions occur, the rising hot water reaches the surface as hot springs. Where resistance to the free circulation of hot water does exist, the increased temperature and pressure may result in geyser action. A precise count of all the individual thermal features in Yellowstone is virtually impossible. Various estimates range from 2,500 to 10,000, depending on how many of the smaller features are included. Of these, at least 200 act as geysers, and about 60 reach a height of three meters or more. The U.S. Geological Survey indicates that this is a greater number than occurs at any other place in the world.

About ten percent of the park is covered by water, the largest amount of which is contained in Yellowstone Lake, with a surface area of 35,600 ha. The Yellowstone River originates in the adjacent wilderness area of the Bridger-Teton National Forest, then flows for approximately 112 km through Yellowstone National Park. Another major river, the Snake, starts inside the park. The hydrographic divide between Atlantic and Pacific drainages crosses the park at an average elevation of 2,500 meters and was eloquently described by the Earl of Dunraven in his 19th Century book, *The Great Divide: Travels in the Upper Yellowstone in the Summer of 1874*. "Stretching out its arms between the streams," he wrote, "it seems to say to one 'Run in that direction,' and to another 'Flow in that' . . . That rock is the keystone of the continent . . . the very crest of the Great Divide."

Precipitation ranges from 25 cm at the north boundary to 200 cm in the southwest corner. Most of

the precipitation comes in the form of snow in the winter months.

The comparative recency of the lava formations accounts for most of Yellowstone's 41 waterfalls; not enough geologic time has yet passed to allow erosion of the features which produce these falls. The best known are the Upper (33 meters) and the Lower (94 meters) Falls of the Yellowstone River in the Grand Canyon of the Yellowstone, a colorful, precipitous gorge, 300 to 450 meters deep and 32 kilometers long.

Temperatures range from -12°C mean January, to 13°C mean in July at Lake Yellowstone in the center of the park.

Flora and Fauna

Yellowstone Park is largely forested by five species of coniferous trees. Lodgepole pine (*Pinus Contorta*), which in many areas forms a climax forest, covers by far the largest part. Where it does not constitute climax, this tree also plays a major role in the spruce-fir zone. *Picea engelmanni*, *Abies lasiocarpa*, *Pseudotsuga menziesii*, and *Pinus albicaulis* are important canopy trees. Also present in the park are small areas of semi-arid grassland, Artemisia shrub steppe, and alpine tundra. Approximately 1,000 species of vascular plants are represented, including two which are found nowhere else in the world—*Arabis fruticosa* and *Agrostis rossae*. Thermal areas also contain specialized groupings of algae and bacteria which are uniquely adapted for survival in these unusual conditions.

The park contains six species of ungulates (elk, mule deer, moose, pronghorn, bighorn sheep, bison), two species of bear (black and grizzly), and 49 other species of mammals, including mountain lion and wolverine. Its bison herd includes the only continuously wild free-ranging such animals in the United States whose numbers are naturally regulated. Originally they were mountain bison which now have mixed with introduced plains bison.

The wolf (*Canis lupus eromotus*) is known to have lived in the park in the past but its numbers now are uncertain.

The Yellowstone cutthroat trout (*Salmo clarki*), found only in Yellowstone Lake and its tributaries, maintains its population through natural reproduction. The arctic grayling (*Thymallus arcticus*) also is native.

Important birds include the trumpeter swan, bald eagle, golden eagle, osprey, and white pelican. Each of these bird species nests within the park.

History

Archeological data indicate that people have visited the Yellowstone area for over 10,000 years. Campsites and stone artifacts point to people who periodically hunted animals in Yellowstone, but probably did not live there on a permanent basis because of the severe climate. The one exception to this is small, both in numbers of people and in time span covered, and consisted of small bands of native Americans called the Sheepeater Indians who were found living in what is now Yellowstone National Park by European-Americans who arrived there from the eastern United States in the early 19th Century. Other tribes hunted the area seasonally or migrated through.

In connection with a young and growing fur trade, several trappers made visits to Yellowstone before 1840, and their reports caused the Rocky Mountain region to be explored quickly. At first, their stories about Yellowstone's thermal features were largely disbelieved, but then gold was discovered near Yellowstone about 1860, and at once several crude mining camps were established along the drainage of the upper Yellowstone River. Miners explored the geyser basins and spread news of their existence.

These reports led to expeditions by groups whose motivation was more curiosity than profit. The first group to come into the Yellowstone country solely for the purpose of seeing what it contained was the Folsom-Cook-Peterson party in 1869. That group was followed by the Washburn-Langford-Doane expedition, and the writing and lecturing done by members of this second party led to official exploration by the United States Geological Survey of the Territories in 1871.

The Geological Survey report, together with photographs by William H. Jackson and paintings by landscape artist Thomas Moran, resulted at last in national recognition of the superlative nature of the Yellowstone region. The Congress of the United States was persuaded to set aside 866,300 hectares as the Yellowstone National Park, and President Ulysses S. Grant signed the bill into law on March 1, 1872.

The new park was placed in the care of a superintendent who was left without funds for its administration, and without laws for its protection—circumstances which made it impossible to accomplish what was expected of him. The four superintendents who succeeded him also were unable adequately to develop and protect the park, and eventually the job of managing it for the nation was assigned to the U.S. Army. From 1886 to 1916, it administered the park, correcting many of the prior abuses and enforcing the existing laws. The U.S. Corps of Engineers constructed the basic road system, totalling approximately 480 kilometers.

In 1916, the U.S. Congress authorized a new agency, the National Park Service. Under this Service, Yellowstone and 300 other units of the National Park System are administered by superintendents as-

sisted by a corps of rangers who now have the power of civilian police. This form of management has proved satisfactory to the present. In 1926, 1929, 1930, and 1932, boundary adjustments were made to Yellowstone National Park by the United States Congress. These adjustments both added and subtracted from the size of the park, but the net result has been an increase of 32,050 ha. to its present size of 898,349 ha.

IV. State of Preservation-Conservation

A. Diagnosis

Although full protection of park resources did not become a reality until many years after the park was established, the major purpose of present management is to maintain natural conditions with minimum influence by man. Development for human use (roads, hotels, campgrounds, utility systems, etc.) is confined to corridors for travel and overnight use, all within approximately one per cent of the total park area. In the remaining 99 per cent, visitors are permitted to visit overnight on a regulated basis through a permit system. Tight restrictions control the amount of use, sanitation, interference with wildlife, and control of man-caused fire.

No species of mammals has been extirpated from the park since its establishment. Except for the wolf, whose numbers are unknown, all other endemic, non-migratory species are present. Migratory birds and ungulates cannot be totally protected by the park, but for many other species of wildlife, Yellowstone provides habitats that are ecologically complete. Buffer zones in the form of wilderness areas adjoin a large percentage of the Park boundaries and afford added protection.

The National Park Service generally provides staff and funds that are sufficient to manage, maintain, protect, and interpret park resources and developments.

B. Agent Responsible for Preservation-Conservation

The United States Government is responsible for Yellowstone National Park. The park is administered through the U.S. Department of the Interior by the National Park Service.

C. History of Preservation-Conservation

The events of the past 106 years discussed in the preceding section also describe the history of conservation in Yellowstone National Park. As indicated, little was known about the area until 1870, which means that the idea of setting it aside as a national park came to fruition in the remarkably short time of less than two years. Most of Yellowstone's history after the park's establishment in 1872 is a record of its preservation and conservation as a national park.

D. Proposed Projects for Preservation-Conservation

Presently, increased emphasis has been placed on preserving the historic resources of the park. More than 35 buildings at park headquarters were constructed by the U.S. Army during its administration of the park between 1886 and 1916. These buildings portray an active, early period of national park management, and for this reason alone they would have great significance. However, the history and architecture of many of the structures represent values beyond their historical component. These buildings and others are proposed for exterior stabilization and adaptive restoration, so that they may continue to serve modern purposes within their historic exteriors. Of special interest are the immediate plans for adaptive restoration of the bachelor officer quarters (circa 1909). This building will house a new museum and auditorium in which the national park concept will be interpreted. The central theme will illustrate how national parks and equivalent reserves have been created by over 100 nations within the basic concept set by Yellowstone.

The archives of Yellowstone National Park will be preserved and made available to scholars for use within the building. The resources of the new museum will make it an important center for national and international park studies.

E. Means for Preservation-Conservation

Included in this nomination is the "Statement for Management for Yellowstone National Park," which cites the laws and other authority for administration of the area. It sets forth the objectives of park management, and will become the first section of a new General Management Plan, which will include a Resource Management Plan, Visitor Use Plan, and a General Development Plan. This new planning system supersedes the earlier Master Plan and requires periodic review and updating by management.

V. Justification for Inclusion In The World Heritage List

Important as Yellowstone Park is as a protected area of rare geological phenomena and processes, as a manifestation of geothermal energy, natural beauty, and ecosystems where rare and endangered species survive, Yellowstone is unique in one other important respect. It represents the “flowering of an idea”—the successful establishment and continuous operation of the first national park in the United States. For this reason it is felt to be especially fitting that Yellowstone National Park be nominated to the World Heritage List—because it possesses both natural and cultural values of universal significance in the world, and because it has led mankind to honor and care for these values.

A. Justification as a Cultural Property; Outstanding Importance in Terms of Influence on Subsequent Developments

The idea of a national park is one of outstanding universal value. It is a measure of the cultural achievement of a nation that it sets aside portions of its land to preserve its natural and historic heritage. Yellowstone commemorates the beginning of a new land-use ethic undertaken as *an accomplishment of a nation*. Roderick Nash, a distinguished American student of conservation history, wrote in “The American Invention of National Parks” that since the establishment of Yellowstone, “we have exported the national park idea around the world. We are known and admired for it, fittingly, because the concept of a national park reflects some of the central values and experiences in American culture.”

In 1972, the Second World Conference on National Parks was held in Yellowstone and Grand Teton National Parks in recognition of the National Park Centennial. This Conference was co-sponsored by the United States and the International Union for Conservation of Nature and Natural Resources. A special ceremony was held at Madison Junction in Yellowstone National Park for all delegates in recognition of the origin of the national park idea.

Today, more than 100 nations have their own national parks or equivalent reserves. In all probability, many of the natural and cultural sites selected for the World Heritage List also will be national parks because they preserve sites of the highest significance to individual nations. The World Heritage List now adds another dimension to such preservation; it provides recognition for those sites whose importance transcends the boundaries of any nation.

B. Justification as a Natural Property

As a natural property, Yellowstone meets all four of the criteria for inclusion on the World Heritage List. A discussion of each follows.

Criterion 1: Evolutionary History of the Earth

Vulcanism is one of the major geologic forces which has shaped the earth, so an area that contains all of the manifestations of the volcanic process has worldwide significance. Within Yellowstone National Park is a clear record of volcanic eruptions throughout much of the past 55 million years, with the potential that another could occur in the relatively near future.

The volcanic story can be found in the following Yellowstone settings:

- a. The Absaroka Mountains along the park's east boundary are remnants of early Eocene volcanoes. Mount Washburn and Bunsen Peak within the park also are remnants of volcanoes, all contributing over 900 meters of lava, breccia, and ash to the landscape.
- b. The series of 27 fossil forests, preserved by ash falls during volcanic eruptions, are probably unique. Most of the petrified trees in these forests are in their vertical, growing position. Thousands of leaf prints make it possible to identify over 100 species of trees and shrubs.
- c. The world's largest recognized caldera is contained within the park. Measuring approximately 48 x 64 kilometers, the immense depression cuts away the south half of Mount Washburn. Most of Yellowstone Lake lies in the caldera.

- d. Lava flows are visible in numerous locations, such as columnar basalt at Tower Falls and Sheepeater Cliffs. Other flows have unusual interest, particularly Obsidian Cliff, which shows a high percentage of natural black glass. Each of Yellowstone's lava flows represents the addition of fresh rock to the surface of the land.
- e. The world's largest concentration of hot springs and geysers is in the park. These hydrothermal features release energy from one or more magma chambers within the earth's crust near the surface. Geysers such as Old Faithful, Grand, Steamboat, Great Fountain, and Castle are constant and continuing reminders of the volcanic past that has shaped Yellowstone's landscape.
- f. Earthquakes are frequent indicators of tectonic stress or movement of the magma. Seismographs within the park have recorded as many as 3,000 events per year, although less than 50 are usually felt by people. The strongest earthquake recorded was on August 17, 1959, with a Richter Scale strength of 7.1. Geophysical data collected by the U.S. Geological Survey point to a large magma chamber within a few kilometers of the surface in which the rock is still in a plastic condition.

Criterion 2: An Area for On-Going Evolution of:

a. Geological Processes

The geysers and hot springs of Yellowstone already have been cited as evidence of recent vulcanism. In themselves, these numerous geysers, hot springs, mud pots, fumaroles, and spouters are agents of rapid geologic change. The hot springs which flow from rhyolite rocks deposit geyserite (SiO_2) near their vents and in runoff channels. Around some thermal areas, geyserite is deposited very rapidly and builds huge cones.

The hot springs at Mammoth issue from beds of Cretaceous limestone and carry copious quantities of calcium carbonate. Travertine, deposited at the rate of approximately 1.8 metric tons per day, creates an enormous complex of cascading terraces. New springs break forth several times per year as rapid deposition of travertine closes off old openings.

b. Biological Processes

Yellowstone's 898,349 hectares of protected land include three major vegetation zones: a spruce-fir zone covers the largest area, followed in extent by a rather large lodgepole pine zone and a smaller Douglas fir, sagebrush-steppe zone. Alpine tundra occurs on areas above 3,000 meters. A small area near park headquarters supports a Cold Desert vegetation. All flora in the park is allowed to progress through natural succession with no afforestation being practiced. Forest fires, if started from lightning, are often allowed to burn if there is no danger to human life or developments. This permits the natural stress of fire periodically to assert itself.

Protection of 1,000 species of flora and 57 species of mammals, as well as the natural processes which affect their population and distribution allow biological evolution to proceed with minimum influence by man. Since 1969, no manipulation of any wildlife population has been carried out. Yellowstone is now registered as an International Biosphere Reserve in recognition of the natural conditions under which the park is maintained.

Criterion 3: Unique, Rare or Superlative Natural Phenomena . . . or Areas of Exceptional Natural Beauty

Most of the world's geysers are located in Yellowstone National Park, and these hydrothermal fea-

tures are especially rare. As superlative natural phenomena, Yellowstone's geysers are famous throughout the world, especially Old Faithful. More than 2.5 million people visit the park each year, primarily to see its geysers.

Among the more imaginative literary renditions of Yellowstone's thermal features came from the genius-dipped pen of Rudyard Kipling, who wrote in 1899:

"From right to left came the trumpeting of elephants at play. I stepped into a pool of old dried blood rimmed with nodding cornflowers; the blood changed to ink even as I trod; and ink and blood were washed away in a spurt of boiling sulphurous water spat out from the lee of a bank of flowers."

An area of exceptional natural beauty in the park is the Grand Canyon of the Yellowstone River, with its brightly colored rocks and two river falls totalling 130 meters. The yellow rock is recognized by canyon visitors as the reason for the river's name and thus as the name of the park. It was the spectacular Grand Canyon of the Yellowstone, as portrayed by landscape artist Thomas Moran and by photographer William H. Jackson in 1871 that helped convince the Congress of the United States that such scenic beauty should be preserved as a national park. Later, President Theodore Roosevelt wrote: "There can be nothing in the world more beautiful than . . . the Canyon of the Yellowstone . . . and our people should see to it that (it) is preserved for their children forever, with . . . majestic beauty all unmarred." While natural beauty is a subjective value, the broad views of valleys punctuated by mountain after mountain rising above timberlines are considered superlative by most visitors.

The edges of many lava flows create 41 waterfalls in the park, 23 of which are concentrated in the southwest section. Lakes constitute approximately 10 per cent of the park area, with none altered by any water control structures. Most lakes have a background of high mountains and together they offer strong photographic appeal.

Criterion 4: Habitats Where Populations of Rare or Endangered Species of Animals Still Survive

Yellowstone's large area contains watersheds and intact ecosystems that are unaltered by human activities. These ecosystems have been protected as a national park longer than any other in the world—more than a century. Prior to its investigation in 1870-71 by scientific parties, the Yellowstone region was one of the least-known areas in the United States. In its seclusion, the last surviving wild bison were found after a 50-year period of concentrated hunting had wiped out the vast herds from the rest of the country.

Essentially, the Yellowstone region was "discovered" by reliable authorities, explored scientifically, and established as a national park within the unbelievably short timespan of four years. Although complete protection of predatory species was not provided for several decades, all indigenous species of plant and animal life in the region are still present today. The area is essentially the same wilderness it has been since prehistoric times, with only one per cent changed and developed to accommodate visitors.

Yellowstone National Park contains ecosystem components necessary for the continuity and perpetuation of such rare, threatened, or endangered species as grizzly bear, wolf, mountain lion, arctic grayling, Yellowstone cutthroat trout, bald eagle, and trumpeter swan. A special ecosystem component in Yellowstone is the presence of heated ground near hot springs, which provide snow-free grazing and rest areas in winter.

Migratory white pelicans nest each year on small islands in Yellowstone Lake, the only nesting area for this species within a national park. Only seven white pelican breeding areas exist in North America.

All plant and animal species in the park have self-sustaining populations, with the possible exception of the wolf. Research has not established that wolves are present in sufficient numbers to interact socially and breed successfully.

Yellowstone National Park is the fully protected core of a larger area of Federal lands surrounding it.

Grand Teton National Park nearly adjoins Yellowstone on the south, while five national forests surrounding these two parks act as controlled buffer zones. The national forests are managed by the Federal government under multiple-use policies that are generally compatible with the preservation management of the National Park Service. Exploitation of the limited private lands outside the National Park has occurred in varying degrees, but this land use is primarily residential. Some poaching does occur, but Ranger patrols and court convictions limit this illegal activity to a relatively minor problem.

In all four criteria, Yellowstone National Park represents the conditions of integrity—sufficient size, variety, and continuity to represent an unbroken story from ancient to present time and every indication that the story is continuing to unfold according to nature's evolutionary design.

"One may imagine the trembling, rocking, tumultuous waving of those ancient Yellowstone woods, and the terror of their inhabitants when the first foreboding shocks were felt, the sky grew dark, and rock-laden floods began to roar. But though they were pressed and buried, cut off from sun and wind, all their happy leaf-fluttering and waving done, other currents coursed through them, fondling and thrilling every fibre, and beautiful wood was replaced by beautiful stone. Now their rocky sepulchres are partly open, and show forth the natural beauty of death." John Muir

"One may lack words to express the impact of beauty but no one who has felt it remains untouched. It is renewal, enlargement, intensification. The parks preserve it permanently in the inheritance of the American citizen." Bernard De Voto

"The founders of the national park system acted wisely when they had the first national park set apart. Not set apart to be uselessly hoarded as a miser hoards his idle gold, but set apart for definite, prescribed uses, to work for the Nation's welfare, just as properly invested capital works and accrues benefits for the investor." Arno B. Cammerer

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THE BEARS OF YELLOWSTONE FACT SHEET

GRIZZLY BEAR (*Ursus arctos horribilis*)

Description

1. Belong to the family Ursidae - bear family.
2. Stand 3-3½ feet at shoulder.
3. Adult males weigh 500-1,000 pounds. Females weigh 225-550 pounds.
4. Large bear with shoulder hump and dished-in facial profile-ears rounded
5. Vary in color from black-brown to straw-yellow. May have light tipped guard hairs that give a grizzled or "silver tip" appearance. White collars on young bears are not uncommon.
6. Long gently-curved claws on forefeet.

Reproductive Biology

1. Breeding occurs from mid-May to mid-July.
2. Large males fight for females - are promiscuous.
3. Period of embryonic delay 5-6 months - Gestation 6-8 weeks.
4. Cubs born in Jan.-Feb. in winter den - weigh 12-16 ounces.
5. Cubs emerge from den with female in April-May.
6. One to three cubs common - four unusual.
7. Wean young as yearlings or as two-year-olds in spring.
8. Reproductive rate - one cub per adult female every two years.

Habitat

1. Formerly plains, mountains and river bottoms.
2. Now remote wilderness areas, uplands, mountains to above timberline.

Food Habits

1. Omnivorous - feed on plant foods, small mammals (mostly rodents), large mammals, and carrion.
2. Excavate roots and bulbs with forefeet.
3. Excavate mice from surface tunnels, ground squirrels from burrows.
4. Sedges eaten in spring, grasses, clovers and forbs throughout year.
5. In summer eat a wide range of berries - huckleberries favored.
6. In fall and spring eat whitebark and limber pine nuts.
7. Conceal carcasses of large quarry and return at intervals to feed.
8. Live on fat reserve and lose weight during winter sleep.

Enemies

1. Man - Native Americans respected and revered the grizzly but killed him for his claws, and as a show of bravery - Today man kills grizzlies for food, as trophies, or when they threaten man or kill his livestock - Grizzlies need protection; however, control of some animals is necessary.

The Grizzly is a threatened species within the contiguous 48 states. An estimated 350 inhabit the "Yellowstone Ecosystem".

THE BEARS OF YELLOWSTONE FACT SHEET

BLACK BEAR (Ursus americanus)

Description

1. Belong to the family Ursidae - bear family.
2. Stand 2-3 feet at shoulder.
3. Adult males weigh 200-600 pounds - Females weigh 125-350 pounds.
4. Color varies from black to brown to light blond - May have white V-shaped throat or chest patch.
5. Profile of nose is straight - ears pointed.
6. Claws on forefeet are short, sharply curved, and pointed.

Reproductive Biology

1. Breed in June and July.
2. Are promiscuous.
3. Period of embryonic delay 5-6 months - Gestation 6-8 weeks.
4. Cubs born in Jan. - Feb. in winter den.
5. Cubs emerge from den with female in April - May.
6. Normally 2 cubs - can have litters of 1-4.
7. Cubs normally weaned in Sept. at 7 months - Winter with mother in den - Family unit usually breaks up in late spring.
8. Females normally breed in alternate years.

Habitat

1. Found throughout U.S. except desert regions - Abundant in mountains and forests of the West.

Food Habits

1. Omnivorous - eat both plant and animal foods.
2. Feed primarily on herbaceous plants, berries, small mammals (mostly rodents), and insects.
3. Feed on carrion - occasionally kill deer, elk, and livestock.
4. Excavate gophers, ground squirrels, and mice from tunnels with forefeet.
5. Strip bark off trees to eat cambium - usually in spring and early summer.
6. Eat grasses, sedges, and forbs throughout year.
7. In summer consume wide variety of berries, especially fond of huckleberries.
8. Eat whitebark and limber pine nuts in fall.

Enemies

1. Man - suitable habitat has been restricted by man - hunts black bear for meat, hides, and as trophies.
2. Grizzly - will attack and may kill black bears.

An estimated 500 - 650 black bears inhabit the "Yellowstone Ecosystem".

This information was taken from "Large Mammals of Yellowstone and Grand Teton National Parks" by Karen Craighead.

THE YELLOWSTONE PARK ACT

Approved March 1, 1872

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that the tract of land in the Territories of Montana and Wyoming, lying near the headwaters of the Yellowstone River . . . is hereby reserved and withdrawn from settlement, occupancy, or sale under the laws of the United States, and dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people.

World Heritage Media Seminar
Yellowstone National Park
Madison Junction
August 6, 1980

REMARKS BY ROCKY MOUNTAIN REGIONAL DIRECTOR LORRAINE MINTZMYER

On behalf of the National Park Service and the United States of America I want to welcome you to Yellowstone National Park, and in particular I want to welcome you to Madison Junction. It was here in 1870 that a party of explorers sat around a campfire and gave rise to the National Park Idea. It is an idea which has travelled around the world and today unites the globe through the World Heritage Program, which recognizes natural and cultural areas of the world as examples of the history of the earth and mankind--a history which has no international boundaries, but is important to us all.

Yellowstone is more than just the first national park in the United States. It was also the first area in the United States recognized as a World Biosphere Reserve in 1976, and the first natural area in the United States to be recognized as a World Heritage site.

Although Yellowstone was primarily set aside in 1872 for the preservation of its thermal features, it is also enjoyed each year by nearly two million visitors from around the world for its immensity, its diversity, and its abundant wildlife.

I hope that as you visit Yellowstone you will be resurged with energy, interest and enthusiasm for the World Heritage Program and will carry the message back to your countries and your fellow citizens.

I believe that the future of the earth rests in the wise use and the preservation of those resources from which life springs, and those which record mankind's past. The World Heritage Program recognizes the critical need to preserve these irreplaceable natural and cultural properties which have special meaning to all the peoples of the world, and we are pleased to participate in this important program.

May 1979

Population Status of Large Mammal Species in Yellowstone National Park

All counts provide only a rough estimate of minimum population numbers. Counts of large mammals depend primarily on the animals' visibility from the air. Visibility varies greatly depending on such factors as snow, weather conditions and food availability, which influence the use of forest versus open habitat. The behavior and habitat preferences of certain species, such as moose or bears, limit the usefulness of aerial counts.

Management - No manipulative management is now planned within the park. Intensive research efforts of the past 12 years indicate that, in general, none is needed nor justified by data for any of the below species.

Natural regulation of all ungulate species is still a topic of intensive research. Periodically harsh winters appear to be a major regulatory mechanism; this particular winter would be determined moderate with no more than usual winterkill of mainly old animals, a few young. Very few winterkilled animals are visible because of light mortality.

Winterkill provides an essential food source for other forms of wildlife, especially bears, eagles, coyotes, ravens and magpies, and perhaps a rare wolf. Insectivorous birds may be very dependent on invertebrate fauna from winterkill carcasses some years.

Predators - Original faunal species are present as populations with the exception of the wolf. We may have an occasional wolf, but no pack activity and no sustained population.

Bears - Grizzly - estimate 350 (including adjacent national forest lands); population appears to be increasing somewhat. Black - 650; population stable, occasionally seen from roads.

Bighorn Sheep - Spring population count of 470. Sheep are more common in northern third of the park.

Bison - There are three population units; one showing marked increase, two essentially in dynamic equilibrium. There is no manipulative management within the park. Present population minimum is 1550 (acruel count, pre-calving).

Elk - There are five summering populations. Parkwide summer figures are approximately 20,000. Approximate winter population is 10,000-12,000.

Moose - Common, no attempt to count. Most frequent in forested areas; widely scattered throughout the park.

Mule Deer - Total of at least 1100 on Northern Range early April 1979 (mostly outside park at that time). Mostly seen in northern areas of the park.

Pronghorn - Count of 152 in April 1979 between Mammoth and Reese Creek and Mt. Everts area of Northern Range. Population may be recovering from effects of manipulative management of 15 year ago, combined with some subsequent hard winters.

GEYSERS - BASIC CONCEPTS

By Dr. Donald E. White
(extracted from a longer article)

What is a geyser? A geyser is a special kind of hot spring that from time to time spurts water above the ground. It differs from most hot springs because it has periodic eruptions, separated by intervals without flow of water. The temperature of the erupting water is generally nearly at boiling for pure water (212°F or 100°C at sea level). Some geysers erupt every minute or so, but others are inactive for months or even years between eruptions. Contrary to popular opinion, most geysers are very irregular in their behavior; and each is different in some respects from all others. Among the major geysers, only a few, such as Old Faithful, are predictable enough to satisfy an impatient tourist; even Old Faithful varies from about 30 to 90 minutes between eruptions, with an average interval of about 65 minutes.

Why do geysers erupt? Briefly, geysers erupt because:

1. In some volcanic areas, water from rain and snow seeps thousands of feet underground, where it is then heated greatly from contact with hot rocks. Temperatures of this deep water can attain 400°F (200°C) or higher--much above boiling water at the surface; this is possible because of the high underground pressures.
2. The heated water expands and rises rapidly upward. Near the surface, where pressure is low enough, some of the water boils to steam producing hot springs. In most hot springs, the steam (and extra energy) is lost by steady, quiet escape.
3. A few springs, however, have too much extra steam or energy to be lost by steady escape. From time to time, steam bubbles become too abundant to escape quietly through the water; the steam lifts the water, sweeping it upward and out of the vent, thereby lowering the pressure at deeper levels, increasing boiling, and starting a chain reaction that leads to eruption. These springs are the special kind we call geysers.

Where do geysers occur? Hot springs with temperatures near boiling are rather common in many of the "hot spots" of the world, especially in the "circle of fire" of active or recently active volcanoes around the Pacific Ocean. However, geysers are not common, and only a few of the boiling springs are true geysers. The word geyser comes from the Icelandic word geysir which means to gush or rage; Great Geysir (gay-zeer) is a famous geyser in southern Iceland. A large proportion of the known geysers of the world are in Yellowstone Park, in northwestern Wyoming. Other major geysers occur in New Zealand, Chile, and the Kamchatka Peninsula on the Pacific side of the Soviet Union. Small geysers are also known in other countries and in several of our western states. The Beowawe area of northcentral Nevada formerly had many beautiful small geysers; but most of these, and others in New Zealand, Iceland, and some other countries, have become inactive in recent years as a result of exploration for geothermal power (the use of natural steam to produce electricity).

What causes volcanoes and hot springs? All rocks have small amounts of natural radioactivity that produce heat at very low but steady rates. Deep mines and oil wells all over the world increase in temperature with increasing depth below the surface of the earth because of this radioactive heat. Volcanoes and hot springs are also related to this natural heat from radioactivity. Some hot spring systems have little if any extra heat other than this "normal" heat of the earth. At depths greater than 20 miles (or about 32 kilometers), the molten magma of volcanoes forms by accumulation of enough heat to melt rocks. Some molten magma moves up to the surface in volcanic eruptions. However, some magma moves up close to the surface of the earth and then stops, forming "hot spots" that may be small or very large. This molten magma adds extra heat to the normal amount near the earth's surface. In some places, water that falls as rain or snow circulates down underground close to these "hot spots" and is heated enough to sustain geysers.

Figure 1 shows the changes in temperature that we expect with increasing depth below the surface of the earth in two kinds of areas. Curve A shows the average change in temperature for deep mines and oil wells. Curve B represents an area that is underlain by molten magma, providing the extra heat for the upflowing water of geyser bearing systems. Curve C shows the boiling points of water with increasing depth and pressure within the earth. Holes have been drilled deep into hot spring areas throughout the world, and this research has shown that these high temperatures are necessary to produce geysers. The geyser systems that have been drilled always show subsurface temperatures at least as high as 300°F (150°C), and all that have been drilled deep enough show temperatures of 400°F (204°C) or more. Our deepest research drill hole in Yellowstone Park (at Norris Basin) showed 465°F (240°C) at 1,088 feet, where temperatures were still climbing!

The deep circulation of water in geyser systems. Figure 2 shows a model of a high-temperature circulation system. The diagram cuts across a large area (perhaps ten miles wide, ten miles long, and three miles deep) that includes a number of geysers as well as an extensive surrounding region that supplies the necessary water. (Imagine, for instance, the diagram as applied to the entire Upper Basin area of Yellowstone Park.) The geysers and hot springs are in the visible "skin" but are only a small part of the total system. Near the surface of the upflowing part, the hot water has brought up and deposited silica and other minerals, tending to form a self-sealed cap or "lid" on the system. The hot springs and geysers are fed by water under high pressure that can leak through cracks in this self-sealed cap. Hard material deposited from hot water can be seen in the geyser basins; it is called sinter.

Nearly all of the water of geysers and hot springs originates as rain or snow that falls on the higher ground around the geyser basins (Point A on the diagram). Most of the water flows off into rivers, but some seeps deep underground through interconnected channels and open spaces in the rocks.

At the bottom of the diagram a hot magma chamber is shown, to supply the heat and probably the gasses. Hydrogen and oxygen from the magma can combine chemically to form H₂O or "volcanic water". A little volcanic water or steam may rise from this hot magma, but research has shown that volcanic water is less than five per cent of the total water involved in geyser action.

A tremendous supply of heat is essential for the geyser action. Recent measurements by the U.S. Geological Survey show that the total heat flowing from the Upper Basin of Yellowstone Park is at least 800 times more than the heat flowing from a normal area of the same size. Our geologic studies also indicate that this tremendous flow of extra heat has continued for at least 40,000 years. This large outflow of heat, over many years, is the major reason for believing that a large magma chamber exists below the circulating water of Yellowstone's geyser system.

Our deep research hole in Yellowstone is 1,088 feet; but in other parts of the world, hot spring systems have been drilled as deep as 8,000 feet, where the water is also mostly of surface origin. This is why we think the water of the geyser bearing systems circulates at least 5,000 feet in depth and perhaps to 10,000 feet.

Water circulates in these systems because of differences in temperature. Hot water weighs less than cold water; at 212°F (100°C), water is four per cent lighter in weight than near freezing (32°F or 0°C). Water at 400°F (200°C) is 14 per cent lighter, and at 600°F (about 315°C), water is 28 per cent lighter than at 32°F. The cold water, because of its extra weight, pushes the hot water onward, and eventually upward and out of the system. Differences in altitude between Points A and E of Figure 2 also provide some extra driving force, through gravity.

The circulating water has great differences in temperature. It is cool when it seeps underground from rain or melted snow at Point A. It then seeps down many thousands of feet, is heated only a little when it reaches Point B, but is then heated greatly as it flows from B to C. Its temperatures at Points B and C depend on how fast it is flowing and how much heat is rising upward from the magma chamber. If the water is flowing too fast or the supply of heat is too small, the temperature at Point C is less than 300°F (150°C), and the system cannot have natural geysers at the surface.

There are vast differences not only in the temperature of the circulating water, but also in its pressure. Although the water at Point C may be heated as high as 500°F, it will not boil at that depth because of the tremendous pressure upon it (see Figure 1). The hot water rises upward from Point C because the heat has made it lighter and cold water is driving it onward. As it rises, the pressure decreases. The water eventually flows up to Point D, where the pressure is now so much lower that steam bubbles can start to form. With further rise from D to E, temperatures decrease continuously as the extra heat in the hot water is used to convert some water to steam. The temperature continues to fall as the water rises to the surface because the pressure is falling also, requiring less

heat for the water to boil (see Curve C, Figure 1). At the surface of the earth at sea level, water must be 212°F (100°C) to boil, and at the altitude of Yellowstone Park (because of lower air pressure at about 7200 feet altitude) water boils at only 199°F (93°C). Geysers exist because water can be heated to higher temperatures when pressure is high, but this very hot water must give off its extra heat as steam when the water rises and pressures decrease. Thus, this rising water carries its own extra energy required for major geyser eruption.

* * * * *

Probably in time, all geysers change their behavior and eventually become inactive, as some new geysers are born. Very small changes in the channels and patterns of flow can result in major changes in behavior. This is why all of us must be exceedingly careful not to cause these changes ourselves--such as throwing rocks or trash into a geyser tube or a spring pool. Minute Geyser in Norris Basin of Yellowstone Park is an example of stupidity or thoughtlessness. The western major vent of this geyser formerly erupted nearly 100 feet, but the tube was filled with rocks by careless or curious tourists, so that it can no longer erupt.

Geysers are rare and beautiful. Let us treasure and preserve these wonderful demonstrations of nature's energy!

NATURE AND MAN IN YELLOWSTONE NATIONAL PARK

Yellowstone National Park is administered as a natural area. Such areas are to preserve natural environments and native biota as an integrated whole (i.e. ecosystem) and to provide for the public enjoyment of same in ways that maintain natural conditions. Natural conditions exist to the extent that man does not change things from what they would otherwise be. Obviously changes will occur from natural processes and these need to be distinguished from those due to man. Management in natural areas is restricted to protecting against, removing, or compensating for the activities of man that cause departures from natural conditions.

The retreat of glaciers about 30,000 years ago permitted vegetation and wild animals to occupy the region that became Yellowstone Park. Primitive man arrived about 10,000 years before present and subsisted in small numbers until about 100 years ago when the park was established. All other native species are still present. With the possible exception of the Rocky Mountain wolf, representative populations of all native wild animals are yearlong residents. Additional numbers of elk and muledeer use the park in summer and make annual migrations from and back to wintering areas in Wyoming, Montana, and Idaho.

The present effects of modern man on the park environment and its resident biota are diagrammed on Fig. 1. As shown, less than 1% of the park's 2.2 million acres is permanently altered as roads or facilities that presently accommodate over 2 million visitors each year. The disposal of effluents and wastes from existing facilities does not appear to be causing departures from natural conditions in the remainder of the park.

The remainder of the park represents an ecological system where natural conditions are to be maintained or restored. As indicated on Fig. 1, the extent to which man suppresses naturally-caused fires is causing this system to be different from what it would otherwise be. Departures from natural conditions are greatest in the park's grassland areas which burned on the average every 20-25 years, and least in forest habitats that burned every 100-200 years.

Other measurable departures from natural conditions occur from man's past and present exploitation of native fishes. Less easily corrected departures occur in some portions of the park from past introductions of exotic fishes and plants. Minor departures also persist from eras when native predators and herbivores were artificially controlled, but these are being erased with the passage of time.

Overall, Yellowstone National Park appears to be sufficiently large and ecologically intact to make the objective of preserving a natural ecosystem of mountain environments and native biota obtainable. The objective of providing for the public enjoyment of same in ways that maintain natural

conditions also seems feasible, but only with limits on the numbers of visitors and the kinds of activities that can be accommodated. Most present departures from natural conditions can be corrected by not interfering with natural processes, by the appropriate regulation of humans, or the passage of time. Obviously, the preservation of natural ecological systems requires a "let it be" philosophy. Human judgments of what is good or bad in such systems can only be appropriate within the context of what is or is not natural.

Man's effects on wild animals that are not yearlong residents of the park present some conflicts with the attempts to restore and maintain a natural ecosystem inside the park. A viable population of wolves may only be restored if this species is also adequately protected on certain adjoining state lands. Mountain lions and grizzly bears will also need to be protected on some adjacent lands to occur in natural densities within the border regions of the park. The hunting of elk and mule deer on adjacent lands does not cause serious conflicts, unless such activities restrict migrations from the park.

Recommended Reading

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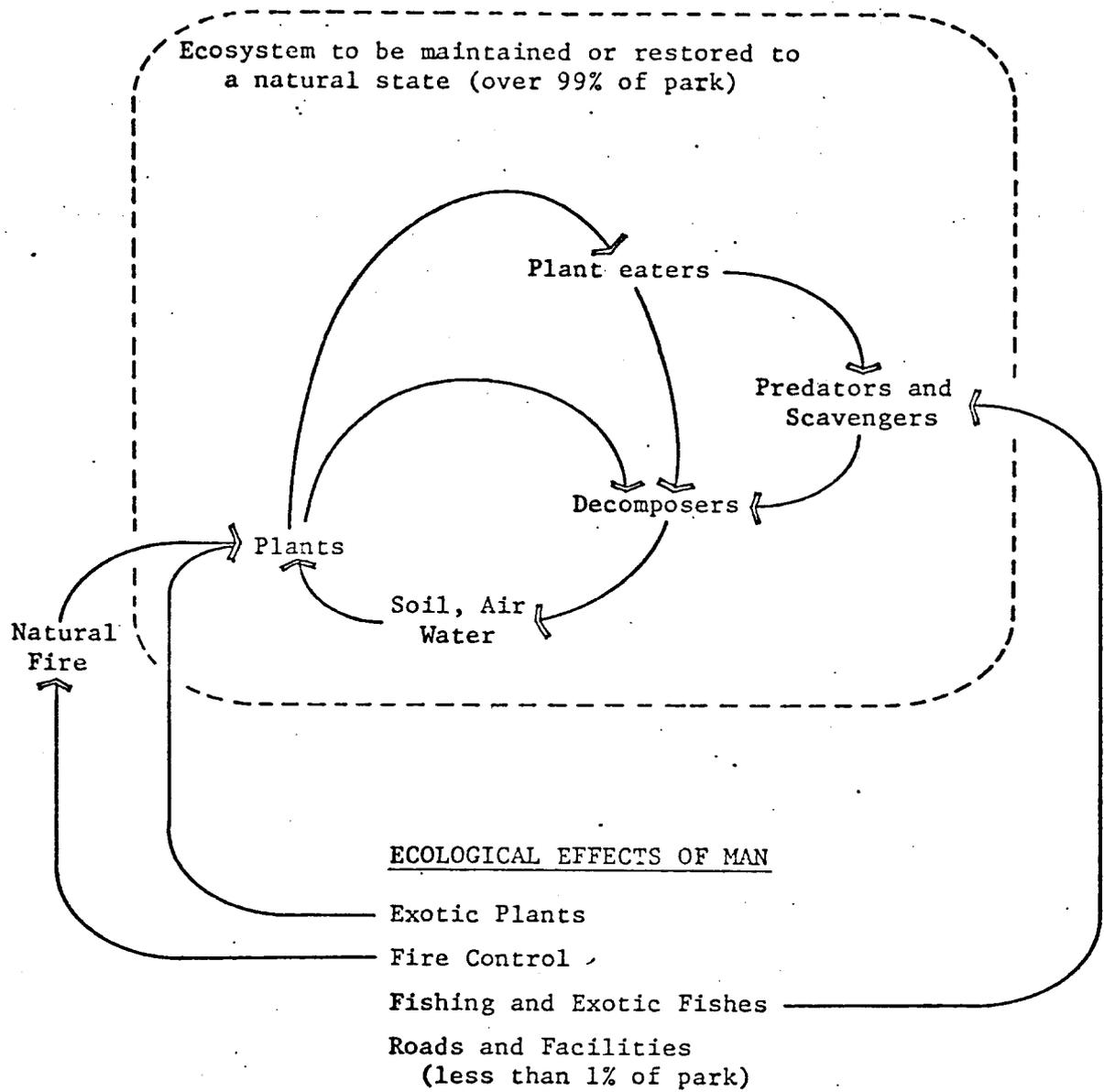


Figure 1. Present ecological effects of man on the cycling of nutrients in the park ecosystem.

(Revised March 27, 1980)

YELLOWSTONE FACT SHEET

General:

3,472 square miles
2,219,822.70 acres or 898,349.93 hectares
63 miles North to South (101 km)
54 miles East to West (84 km)
91.0% in Wyoming
7.6% in Montana
1.4% in Idaho
Larger than Rhode Island & Delaware combined
300 miles of roads
5 entrances
6 manned visitor centers
5 species coniferous trees
6 species ungulates
2 species bears
49 species other mammals
Approx. 10% of park covered by water
Precipitation ranges from 25 cm at north boundary to 200 cm in southwest corner
Temperatures range from -12°C mean January, to 13°C mean July at Lake Yellowstone in the center of the park.

Yellowstone Lake:

136 square miles surface area
(35.36 hectares)
110 miles shoreline (176 km)
N - 20 miles long (32 km)
S - 14 miles wide (22 km)
Average depth - 139 feet
Maximum depth - 320 feet

Geology:

Approx. 10,000 thermal features
Approx. 200 geysers
41 water falls
World's largest caldera - measures 48 x 64 kilometers

THE SIGNIFICANCE OF MADISON JUNCTION IN YELLOWSTONE NATIONAL PARK

Visitors to Yellowstone National Park who find themselves at Madison Junction may feel that this site is merely a road junction, a good place to camp, or an attractive stretch of river for fishing. One also finds an outdoor amphitheatre, and a rustic museum tucked among the trees. The casual visitor may notice all these things before learning about Madison Junction's historic and symbolic significance. This site played a role in Yellowstone's becoming a National Park and a World Heritage Site.

Two wilderness rivers, the Gibbon and the Firehole, merge quietly to form the Madison River at this point. Here the valley widens, yet is bounded by the steep cliffs of Purple Mountain and National Park Mountain. The Gibbon and Firehole rivers lead to major geyser basins, but the world knew almost nothing of this region prior to 1870.

Rumors of boiling springs and geysers had circulated for decades, spawned by fur trappers who sought beaver in the remote headwaters of the "Roche Jaune" river. After the territory of Montana became relatively settled in the late 1860's, expeditions of curious adventurers penetrated the high plateau country and indeed found some of the wonders described by the mountain men. In 1870, a respected group of men organized a major expedition to prove the existence of this strange land. They included N. P. Langford; Henry Washburn, the Surveyor-general of the territory; Cornelius Hedges, a judge; and Gustavus Doane, a lieutenant of the U. S. Army detachment assigned as a military escort. For nearly four weeks they travelled through the rugged area and thick forest, delighting to see with their own eyes the Grand Canyon of the Yellowstone, huge Yellowstone Lake, and the astonishing display of geysers, mud pots, and hot springs.

On September 19, 1870 the party camped at Madison Junction. In later years, Nathaniel Langford remembered their campfire discussion that night as the time when the group discussed the future of this marvelous and yet unsettled Yellowstone country. He credited Cornelius Hedges with expressing the idea that it be set aside as a "national Park", rather than allowing it to be subdivided for personal gain. Whether or not one person deserves such credit might be debated, but there is no doubt that the national park idea was one whose time had come.

In a remarkably short time--only 16 months--there was swift action. The Federal Government sent an official expedition to map and document the Yellowstone country with paintings and photographs. A bill was introduced in Congress to set it aside as "a public park or pleasuring-ground for the benefit and enjoyment of the people", and the Congress passed it. Yellowstone National Park was established on March 1, 1872 when President Ulysses Grant signed the bill, becoming the world's first national park.

As the noted interpretive-naturalist Freeman Tilden wrote, ". . . 1872. Was that year one of great affluence, when we could afford to make a gesture of careless magnificence? On the contrary. It was a period of severe social and economic stress in our country, the aftermath of a terrible Civil War. To bolster the sagging welfare, it was normal that the chief thought would be upon a quickly renewed assault upon all natural resources for profit. Yet out of that very depression emerged Yellowstone--an adventure in the humanities based upon reverence for primitive landscape and beauty and all organic life. One voice in the Senate chamber, that of George Vest of Missouri, said that "we should show the world that they are wrong when they say that Americans are interested only in the almighty dollar!"

As the world's first national park, Yellowstone was nominated as a World Heritage Site. In 1978, The World Heritage Committee included it in its first list of sites, as having "outstanding universal significance for the benefit of present and future generations. It is fitting that Madison Junction be dedicated as the site where our World Heritage plaque will be permanently located.

GEOLOGICAL HISTORY OF THE GRAND CANYON OF THE YELLOWSTONE
BY
GEORGE DOWNING

About 600,000 years ago, a cataclysmic series of volcanic eruptions occurred in an area including the present Upper Canyon of the Yellowstone River. The Upper Canyon is the part of the Grand Canyon of the Yellowstone that is most visited by tourists, the one made accessible by the drives and trails on the North and South Rims.

These great eruptions, one following the other in very rapid succession, partially emptied a large underground magma chamber, resulting in the collapse of the roof of this chamber, forming a caldera many miles across. Geological detective work indicates that a segment of this massive caldera involved in the Grand Canyon story extends from Mt. Washburn on the north past Broad Creek and Astringent Creek on the east to Lake Butte on the southeast.

The caldera subsequently filled with water. The lake that formed eventually overflowed at the lowest point on its rim, near the point where Broad Creek now flows into the Yellowstone River. The heavy bedload of scouring material carried by the waters from the caldera lake eroded the Lower Canyon of the Yellowstone.

Many years later, a lava flow in the area of the present Upper Canyon blocked the head of the ancestral Lower Canyon that had been eroded by the waters of the caldera lake. Overflow of a second lake that formed behind this Canyon flow drained into its former outlet canyon.

The Canyon flow and almost all of the other volcanic products in today's canyon are white and yellow, reflecting the effect of hydrothermal alteration. They have abundant quartz and alkali feldspars as well as small quantities of iron and magnesium-bearing minerals such as pyroxene and magnetite. Generally, however, rhyolites vary from nearly white into shades of pink and grey. The canyon that was eroded into this flow by the drainage of the second caldera lake extended rapidly headward across this flow to the present position of the Lower Falls. This rapid headward erosion was made possible by the altered and weakened condition of the rhyolite caused by the presence of a thermal basin that had appeared on the site. The unaltered rock at the west end of the thermal area left a scarp that now forms the 308-foot Lower Falls of the Yellowstone River. The waters of this rapidly eroding stream most probably entered the Canyon at the site of present-day Crystal Falls where today's Cascade Creek enters the Canyon between the Upper and Lower Falls.

A mid-Pleistocene glacier overrode the Canyon from the north and lake sediments were deposited in the Canyon during and after the stagnation of the ice. These sediments can be seen today in the Canyon between the Upper and Lower Falls on the South Rim, and they are especially apparent at Red Rock Point on the north face of the Canyon. Later, the Canyon was recut through these glacial lake sediments.

Another large flow of rhyolite buried the upper reaches of the Grand Canyon marginal to the Upper Falls 100,000 years ago. The terminus of this flow is just above the present site of the 109-foot Upper Falls. This lava flow changed the course of the overflow waters from Yellowstone Lake which are now the source of the river through the Canyon. It was then that the Yellowstone River as we see it today came into being. It has flowed roughly along its present course since that time.

The Canyon has since been eroded to its present depth. It was then overrun by an ice cap during the next to last glaciation, called the Bull Lake Glaciation. Granite erratics from the north were carried by this ice cap. The large glacial boulder on the road to Inspiration Point is one of these ice-borne erratics. Late during this time, as the ice receded, a lake was retained on the Canyon rim by the ice in the Canyon. Deposits of this lake are especially evident in the road cut just a short distance east of Chittenden Memorial Bridge on the Artist Point Road.

During the last major glaciation, called the Pinedale, which began about 25,000 years ago, another ice cap overran the Canyon from the South. Both of these latest ice caps crossed the Canyon and filled it, but did not scour it. During recession of the Pinedale ice, melt waters flowed through saddles in the Canyon's rim, such as those east and west of Artist's Point and at Silver Cord Cascade, and onto the stagnant ice in the Canyon.

The Canyon today averages 900 feet in depth and 1000 feet in width.

BIOGRAPHICAL INFORMATION

John A. Townsley, Superintendent
Yellowstone National Park

Mr. Townsley was appointed as Superintendent to Yellowstone National Park in 1975. Prior to that, he served as Deputy Director of National Capital Parks in Washington, D.C. for approximately three years.

He was born in Yosemite National Park, the son of Forest S. Townsley, who was Chief Park Ranger in that park from 1915 to 1943.

Superintendent Townsley served in the U.S. Marine Corps and graduated from Colorado State University in 1953 with a bachelor of science degree in biology. He entered the National Park Service as a seasonal employee at Yosemite in 1944 and was a seasonal park ranger at Glacier National Park in 1947. In 1955 he gained permanent status as a park ranger at Hawaii Volcanoes National Park in Hawaii. He was the first superintendent of the New York City Group, which included the Statue of Liberty and seven other park areas, and was superintendent of Mt. Rainier National Park in the state of Washington. He has served as a park planner for the National Park Service and as a policy analyst for a former National Park Service Director.

Mr. Townsley and his wife, Elaine, have three children: Forest, 26; David, 24; and Gail, 19.

EXCERPTS FROM THE STATEMENT OF ROBERT L. HERBST, ASSISTANT SECRETARY FOR FISH, WILDLIFE AND PARKS, REPRESENTING THE DEPARTMENT OF THE INTERIOR BEFORE THE SUB-COMMITTEE ON ENVIRONMENT, SOIL CONSERVATION, AND FORESTRY, SENATE COMMITTEE ON AGRICULTURE, NUTRITION AND FORESTRY, CONCERNING PROPOSED DEVELOPMENT OF GEOTHERMAL RESOURCES ADJACENT TO YELLOWSTONE NATIONAL PARK, JULY 16, 1979.

ISLAND PARK GEOTHERMAL AREA

The Island Park Geothermal Area comprises 488,031 acres of federal land under the administration of the U.S. Forest Service (477,346 acres) and the Bureau of Land Management (10,685 acres) in Idaho, Montana, and Wyoming. In addition, there are approximately 15,000 acres of state land in this area.

More than 70 interested parties have filed approximately 200 lease applications with the Department of Interior's Bureau of Land Management for the exploration and development of geothermal resources on these federal lands. To our knowledge, no development has occurred on the state lands. Responsibility for issuing geothermal leases on federal lands is vested in the Secretary of the Department of the Interior under the Geothermal Steam Act of 1970. Because most of the land in the Island Park Geothermal Area is administered by the U.S. Forest Service, that agency has taken the lead in preparing an environmental analysis.

Yellowstone, the world's first national park was created by Congress in 1872. It was designated a World Heritage Site by the World Heritage Committee of the United Nations Educational Scientific and Cultural Organization (UNESCO) in 1978. UNESCO also designated it as part of the International Biosphere Reserve which recognizes the global value of its natural ecosystems and gene pool. These three designations for Yellowstone - National Park, World Heritage Site and International Biosphere Reserve - combine to give the area the highest possible recognition of its significance to the world. Any man-caused threat to the integrity of its thermal resources is totally unacceptable, both nationally and internationally. Any geothermal exploration or development outside Yellowstone National Park must recognize its unique value on a worldwide basis.

Nearly two million people visit Yellowstone National Park every year. Visitors can see and enjoy 200 erupting geysers within the park, including the legendary "Old Faithful". Moreover, for more than a century, the park has been a protected sanctuary for many wildlife species, some of them now on the endangered list.

Geysers depend on a dynamic, yet fragile, system which can be easily disrupted. Any alteration of heat or waterflow through this natural system can cause the "plumbing" to dry out, disintegrate, or no longer produce geyser action. Further, the thermal areas of the park are important not only for the benefit of visitors, but for the wildlife as well. The natural heat flow and hot water discharge is critical for bison, elk, trumpeter swans, Canada geese, and other animals that congregate in the thermal areas and on the rivers during the winter.

Commercial geothermal development in other areas of the world have had profound effects on geyser basins. Geyser Valley in New Zealand was totally destroyed as a natural discharge area when the Wairakei Geothermal Area was developed. Before this action, Geyser Valley ranked fifth among the major geyser areas of the world. In addition, production from Wairakei also affected another thermal area thought to be independent with no connection at depths which would simultaneously affect the pressure of both systems. As a result, both areas have been destroyed as a national resource and reference line for understanding hydrothermal systems. The Beowawa Geysers Areas of Nevada was once second to Yellowstone on the North American Continent in the 1940's and 1950's when geothermal exploration began. Wells were drilled and permitted to discharge, but not converted to commercial use; by 1961 all springs and geysers had ceased flowing. Similar destruction of the geyser area at Steamboat Spring, Nevada, occurred after geothermal exploration between 1950 and the early 1960's.

Of ten world-ranked geyser areas, only three, including Yellowstone, are essentially undisturbed; four of ten have been adversely affected by man's activities, and at least three of these major areas and several minor ones have seen the total destruction of their geysers.

The exact boundaries of the geothermal reservoir that supplies Yellowstone are currently unknown. Furthermore, it is not known how much of a connection, if any, there is between the proposed lease areas and the thermal areas inside the park, or what adverse effects park resources might experience if geothermal leasing proceeds in Island Park. Thus, unless geothermal exploration and development is very carefully researched, planned, monitored, and controlled, irreversible damage to the geothermal resources in Yellowstone is a distinct possibility. Therefore, it is the position of the Department of the Interior that any man-caused threat to the integrity of Yellowstone's geothermal resources is totally unacceptable, both nationally and internationally.

THE BEARS OF YELLOWSTONE

Black bears and grizzly bears have contributed enormously to the pleasure and interest of visitors to Yellowstone National Park. They have long been the most popular, the most dynamic, and perhaps the most controversial of Yellowstone's abundant wildlife.

Grizzly bear habitat in and around the park covers over 5,000 square miles and includes land under a variety of federal, state, local, and private control. Because wildlife does not recognize man-made boundaries, this large area generally known as the "Yellowstone Ecosystem" is regarded as a unit for cooperative interagency management purposes.

Impressive populations of black and grizzly bears existed prior to modern man's use of Yellowstone. In the early days of the park both black and grizzly bears quickly developed a taste for human foods. The presence of open garbage dumps and the willingness of travelers to stop and feed bears along the roadsides did little to discourage this acquired taste. The problems were magnified as an increasing number of visitors came in contact with a greater number of the roadside and dump-fed bears. This resulted in a heightened potential for injuries to people and damage to property by bears accustomed to human activity. Records from 1930 to 1969 show that artificial food (human garbage or camp groceries) changed the natural habits of part of Yellowstone's grizzly population, and was basically responsible for most (95%) bear injuries to humans. Injuries from grizzlies substantially increased during the 1960's, averaging four per year, as compared to one or less per year during the previous three decades.

The desirability of maintaining bears under natural conditions was recognized by the 1930's; however, attitudes had not yet crystallized regarding the degradation of bears and the inability to have bears both ways. It was in 1970 that Yellowstone National Park embarked on an intensive bear management program with the stated goals of restoring and maintaining natural populations of grizzly and black bears as part of the park's native fauna and providing for the safety of park visitors. To accomplish these goals, the following objectives are critical;

1. To educate the public toward an appreciation of the aesthetic value of bears, and an awareness that exposing bears to unnatural food sources may lead to human injury or the bears destruction, or both.
2. To eliminate unnatural attractants to bears before control actions are required and before contacts occur.
3. To effect prompt removal of bears from developed areas when elimination of attracting food sources hasn't deterred their entry.
4. Research and monitoring are integral parts of bear management. The objective here is to provide management with comprehensive factual knowledge of bear distribution, population dynamics, behavior, ecology of human-bear interrelations and to evaluate the effectiveness of management programs affecting or affected by the grizzly bear population. The Interagency Grizzly Bear Study Team was formed in 1973 to provide this information to park managers.

The coexistence of bears and people in Yellowstone National Park depends largely on our accomplishing these objectives. The results thus far have been encouraging - for the first time in almost a century these truly magnificent creatures are living relatively wild and undisturbed lives. This seems only appropriate in Yellowstone National Park - one of the greatest wildlife reserves in the world.

DRAFT

Statement for Management

YELLOWSTONE NATIONAL PARK

I - PURPOSE OF THE PARK

Yellowstone National Park by its establishment act of March 1, 1872 (17 Stat. 32), was "dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people" and "for the preservation, from injury or spoliation of all timber, mineral deposits, natural curiosities or wonders . . . and their retention in their natural condition."

Since 1872, additional legislation and management policies have further defined the purpose of Yellowstone National Park to prohibit hunting of all birds and mammals within the boundary, and to regulate fishing. The park is managed as a natural area so as to conserve, perpetuate, and portray as a composite whole the indigenous aquatic and terrestrial fauna and flora, geology, and scenic landscape.

II - SIGNIFICANCE OF PARK RESOURCES

The commanding features that initially attracted interest and led to the reservation of Yellowstone as a national park were geological: the geothermal phenomena, the colorful Grand Canyon of the Yellowstone River, and the size and elevation of Yellowstone Lake.

The park has the world's greatest system of fumaroles, boiling springs and geysers. There are nine major "basins" of geyser and hot spring activity in the park, and over 100 clusters of hot springs spread through an area of 1,800 square miles. These geysers and hot springs probably were responsible more than any other feature for the park's establishment.

Second in size only to the Grand Canyon of the Colorado, the Grand Canyon of the Yellowstone is a unique attraction, and evidence of active geological forces is still exhibited in the Yellowstone Country.

Yellowstone Lake, the largest body of water above 7,500 feet elevation on the North American continent, with a 110-mile shoreline, 139 square miles in area, and a maximum depth of 320 feet, supports the largest natural cutthroat trout population in the world.

With the changing values and mores of American society, wilderness and wildlife resources play an increasingly important role. Ninety-nine percent of the park's 3,400 square miles remains undeveloped in a pristine wilderness condition, which includes a wide range of habitat types supporting one of the continent's largest and most varied wildlife populations with several threatened species, such as the grizzly bear and trumpeter swan. As such, it is one of four national parks in the United States that is listed as an International Biological Reserve by the International Union for the Conservation of Nature (IUCN).

The human history of the park includes many cultural sites up to 10,000 years old. More recent history reflects the national park movement after establishment of Yellowstone National Park and demonstrates the evolution of management policies for natural areas.

In 1872, at a point in this nation's history when only a handful of people were convinced that America's natural resources were limited, this world's first national park was created. Today, with the nation and the park facing environmental limits, the original purpose of Yellowstone National Park must be translated in terms of contemporary realities; as such, it should read:

Yellowstone National Park will perpetuate its natural ecosystems in as near pristine conditions as possible for their inspirational, educational, cultural, and scientific values for this and future generations.

III - INFLUENCES ON MANAGEMENT

a. Legislative Constraints

Mounting concern by a few for the conservation of the nation's resources and preservation of its scenic beauty had, by 1864, through the Yosemite Valley Act, established the precedent for perpetual public ownership of significant portions of the public domain for other than material gain or resource exploitation.

The act of March 1, 1872, which established Yellowstone National Park, reaffirmed this principle and laid down criteria for selection of such lands to be set aside, thus establishing the basic framework for the unique land-use policy embodied within the present National Park System.

Subsequent legislation related directly to such diverse park problems as concessions, water rights, school facilities, park protection, lease of lands, and wildlife management, the most pertinent of which are summarized as follows:

The Act of May 7, 1894, provided for the protection of birds and animals within Yellowstone, prohibited hunting, and regulated fishing.

The Act of August 3, 1894, restricted the granting of leases for hotels and outbuildings against inclusion of lands lying within 1/8 mile of any geyser, Yellowstone Falls, the Grand Canyon, Mammoth Hot Springs, or any object of curiosity.

The Act of June 4, 1906, extended the Secretary's authority to enter into leases for the transaction of "business in the Yellowstone National Park . . . as the comfort and convenience of visitors may require, for the construction and maintenance of substantial hotel buildings and buildings for the protection of the stage, stock, and equipment".

The Act of April 9, 1924, authorized the Secretary "to construct, reconstruct, and improve roads and trails, inclusive of necessary bridges, in the National Parks and Monuments under the jurisdiction of the Department of Interior".

The Act of March 1, 1929 (45 Stat. 1435), changed the east boundary to conform more closely to natural topographic features, and included lands known as the Gallatin Addition at the northwest corner of the park, which contained the petrified tree deposits and the winter elk range.

Public Law 592, 71st Congress (January 31, 1931), authorized the construction of the Beartooth Highway entirely outside, and northeast of, the park as an approach road to serve the park. Land jurisdiction remained vested in the States of Wyoming and Montana.

A Presidential Proclamation of October 20, 1932, as authorized by the Congressional Act of May 26, 1926 (44 Stat. 656), added land on the north known as the Gardiner Addition, to include additional winter wildlife range.

Title 4, U.S.C., 105, 61 Stat. 644, State, etc., taxation affecting Federal areas, June 30, 1947. Provides that State sales tax may be collected within the park as if it were part of the State.

Title 16, U.S.C., 40a-40c, 62 Stat. 338, educational facilities for dependents of employees - payment to school districts, June 4, 1948. Provides that money from entrance or visitor-use fees may be used for payment to school districts for children of Federal employees attending State schools, or may be used for construction and operation of schools on Federal property.

b. Administrative Constraints (As per approved Master Plan.)

1. To prevent excessive impact from overnight use, overnight concession accommodations will not exceed an aggregate total of 8,300 pillow count.
2. Development shall be excluded from thermal areas; however, walking-path access and small self-guiding interpretive devices may be permitted. As new thermal features appear, they will be allowed to develop without interference from man, unless they concern the safety of the public.
3. To maintain the quality of a "winter wilderness," park roads will not be snowplowed in winter except for the Gardiner-Northeast Entrance Road. Oversnow vehicles will be restricted to unplowed roadways. Limited eating facilities and overnight shelter may be provided in the interior of the park.
4. Except for the campground, Norris Basin shall continue to operate as a day-use area.
5. The marinas at Grant Village and at Bridge Bay will not be expanded, nor will any additional marinas be provided in the park. Facilities for the disposal of sanitary wastes from boats are provided at both existing marinas.
6. To protect the backcountry resource and maintain the quality of the backcountry-visitor experience, limits are imposed on the number of people, parties, and stock in the backcountry, and on the total number of days spent by one party in any one site or during one season.
7. For safety and resource-protection purposes, visitor use permits are required for fishing, boating, and backcountry use.
8. To prevent overcrowding and to protect the park resource, auto campgrounds are restricted to one party per designated site. When all campsites are full, visitors are directed to concession overnight facilities or to other accommodations outside the park.

c. Within Park Influences

Intrapark factors that influence or are influenced by Management are as follows:

1. Visitation is increasing annually, with significant rises in winter and backcountry use.
2. Visitor impact is concentrated at the prime natural resources, such as thermal basins and spectacular geologic areas.
3. The typical park visitor is becoming more sophisticated, which results in demands for more sophisticated interpretive programs.
4. There has been a significant increase in the size and number of recreation vehicles in the park, which increases demands on parking, campground, and road facilities.
5. Much of the road system, including bridges, signs, and parking facilities, does not meet established standards.
6. There is an increase in the use of bus tours in the park and a trend toward increased bicycle use.
7. Mission-oriented research results in information affecting management decisions which regulate visitor use so as to ensure the retention of natural processes.
8. Increase in visitation requires more rigid regulation of activities to ensure visitor safety and compatibility with the park resources.
9. Visitor accommodations are limited in both size and numbers to reduce impact on park resource.
10. Greater emphasis is being placed on rehabilitation and maintenance of historic structures.

11. Management of access to thermal areas must be done carefully for visitor safety and for protection of the resource.
12. Agreements with United States Fish and Wildlife Service, United States Geological Survey, and United States Public Health Service provide data for regulation and management of resource and visitor use.
13. Policy affects contractual arrangements for utility services within the park.
14. Agreements concerning road and highway right-of-way and maintenance affect park operations.
15. Water, wastewater, and solid-waste system operations within the park require regulation greater than those outside the park to protect park resources.
16. Increased winter use generates a demand for year-round accommodations.

d. Regional Influences

Together, Yellowstone National Park and Grand Teton National Park immediately to the south comprise the strategic core of a vast upland wilderness that is held almost exclusively within Federal ownership. Five national forests and parts of three others define its parameters. Centered primarily within northwestern Wyoming astride the Continental Divide, it extends into Montana on the north and Idaho on the west. As a watershed, the area contributes significantly to the Missouri drainage via the Madison and Yellowstone Rivers and to the Columbia via the Snake. This 27,000-square-mile region is slightly larger than the combined acreage of Vermont, New Hampshire, Massachusetts, and Rhode Island.

Today, recreation surpasses the agricultural and livestock industries as the economic base of the region. Visitors to Yellowstone National Park contributed an estimated \$57.7 million in gross expenditures to the surrounding economy in 1968. In Teton County, Wyoming, tourist expenditures rose from \$6 million to \$13 million between 1958 and 1964. Although summer recreation has been the traditional pattern, the increasing popularity of winter sports is leading to a stable year-round tourist economy.

The nature of Yellowstone National Park as a large natural reserve has influences that are national and even international in aspect, particularly since it is the first national park of the world. For example, interest in the park for basic research is spread well beyond the local region. National special interest groups, such as the Wilderness Society, the Sierra Club, Trout Unlimited, National Parks Association, and others are particularly interested in the management of Yellowstone National Park. National societal trends affect the park in many ways; examples are the trend toward use of recreation vehicles over the past 10 years, the trend of visitors staying longer in the Yellowstone Park area, use of public transportation (such as AMTRAK) to visit the park, national energy problems which not only affect transportation but thermal power exploration and development in eastern Montana and Wyoming.

Yellowstone National Park and the greater Yellowstone region are influenced by many federal laws and policies as administered by federal bureaus. Examples of these are the 1975 Safe Drinking Water Act by the Environmental Protection Agency, the proposal for the Allenspur Dam by the Corps of Engineers in the Upper Yellowstone River downstream from the park, timber cutting, mining, wilderness and wildfire policies in the surrounding national forests, the United States Fish and Wildlife Service in administering the Endangered Species Act, and the United States Geological Survey in thermal power investigations.

Additionally, the National Park Service in Yellowstone has influences on the surrounding region which include administrative restraints affecting park visitor services, control of concession operations in the park which affect accommodations in public facilities in nearby communities, wildlife protection within the park which affects outside hunting, and road closures which change the region's road circulation in the winter.

State and county government programs and policies influence the Yellowstone region. Countywide zoning regulates development of facilities outside the park. State travel commissions promote visitation to the region. State wildlife-management policies affect the park. The park maintains the Beartooth Highway which is within Wyoming and Montana State Highway systems. The State of Montana maintains a portion of the Gallatin Highway within Yellowstone National Park. A cooperative agreement for solid-waste disposal is being explored with Park County, Montana.

Private enterprise within the Yellowstone Region is affected by the park and the park is affected by private enterprise. Dude ranches and outfitters that operate adjacent to the park are affected by park backcountry-management policies. Winter visitation to the region is affected by major ski-area development at Big Sky and the proposed Ski Yellowstone development at West Yellowstone. Private subdivision development adjacent to the park can have a great effect on the park through establishing additional permanent population near the park and taking up wildlife range. Private campgrounds outside the park are affected

by what is done within the park with regard to total number of campsites and the demand for outside campsites. Local business generally is affected by the level of concession operations within the park, not only for accommodations but also for gas stations, wrecker service, gift shops, and restaurants.

Visitor promotion by surrounding communities brings more visitors to the park. A prime example is snowmobiling activity at West Yellowstone. Cross-country skiing within the park is bringing more people to local communities in the wintertime. The communities are affected by being hemmed in by the park or forest lands which can severely limit growth.

IV - LAND CLASSIFICATION

An appendix to this statement is a park topographic map in 1:125,000 scale with a Mylar overlay showing land classification. An explanation of the legend is as follows:

- W. Wilderness Study - In fall of 1972, a proposal was submitted to the President and to Congress recommending that 2,016,181 acres of the park be included in the National Wilderness Preservation System. There are 10 units involved, which are separated by the park road system.
- E. Environmental Protection - There are four Research Natural Areas designated within the park. These are the Specimen Creek-Bighorn Creek Fossil Forest Area, the Specimen Ridge-Fossil Forest Area, the White-Tern-Fern-Wapiti Lakes Area and the Yellowstone River Delta Area.
- O. Outstanding Natural Features - Included in this category are the principal thermal areas, the Grand Canyon of the Yellowstone, Frank Island, Hayden Valley, Grebe and Wolf Lakes, and Tower Fall.
- N. Natural Environment - Those lands maintained in their natural condition that serve as buffers between roads or developed areas and wilderness-study areas. Included in this category is the northern portion of Yellowstone Lake, exclusive of the arms.
- H. Historic - Included in this category are the Fort Yellowstone Area, the Norris Soldier Station and the Old Faithful Inn.
- D. Development - Includes the primary developed areas in the park, exclusive of roads.

V - MANAGEMENT OBJECTIVES

In the Management Objectives for the National Park Service, the Director has given the broad guidelines for servicewide management. For special emphasis, some aspects of the national objectives have been reiterated here, and within the remaining national guidelines, more detailed, specific objectives outline the management direction for Yellowstone National Park.

Perpetuate the natural ecosystems within the park in as near pristine conditions as possible for their inspirational, educational, cultural, and scientific values for this and future generations.

Permit natural processes to function with the park ecosystem with minimum disturbance by man's activities.

Predicate public use, protection, development, interpretation and management of the natural and cultural resources of Yellowstone National park on documented data obtained through appropriate investigation and research.

Maintain an optimum level of control over garbage disposal, food storage, and roadside feeding to avoid recurrence of the bear problem. Though intensive training, retain a high level of expertise in bear trapping, immobilization and handling.

Manage the fishery resource to restore and preserve native fish populations.

Allow fire to play its natural role in the park. Within appropriate national guidelines, assess the potential and make a management decision on each fire that occurs. This decision could range from a total suppression effort to allowing the fire to run its natural course without interference, or any combination of these.

On a cooperative basis with other agencies, develop areawide guidelines for the management of threatened or endangered species.

Maintain close and harmonious relations with neighboring communities, counties and states and work closely with other Federal agencies, private groups, organizations, and individuals in such ways as will provide a full understanding of park operations and purpose.

Identify and minimize the impacts of activities outside the park which may be detrimental to the park resources and purpose.

Identify, evaluate and protect the cultural resources of the park. Restore the exterior of the Fort Yellowstone historic structures.

Eliminate trash and structural debris from the backcountry.

Survey the entire Yellowstone backcountry trail system and relocate, rebuild or upgrade as necessary to meet current requirements.

Conserve nonrenewable fossil fuels and seek ways to utilize alternate energy sources in park operations.

Provide for the highest quality of use and enjoyment for each visitor to Yellowstone National Park and encourage visitors of all interests and ages to make full and appropriate use of park resources.

Provide maximum opportunity for park visitors to move freely and safely throughout the park, using a variety of transportation methods that cause minimum interference with the natural environment. Consideration should be given to the development of a system of walking-paths or public conveyances to principal park features not accessible by automobile, keeping in mind those visitors not physically capable of walking.

Assure cooperation with Federal, State, and local agencies and private enterprise in efforts to provide an appropriate range of overnight and other visitor accommodations and related services outside the park through coordinated planning.

Minimize visual intrusion of human development on park resources.

Make the public aware of unusual environmental conditions and hazards, and provide reasonable visitor protection.

Provide a variety of interpretive media and activities to increase visitor understanding and appreciation of the park's natural, historical, and cultural resources.

Restore Old Faithful to a day-use area, with the obliteration of nonessential, nonhistorical facilities. In the meantime, no additional overnight facilities will be constructed which would increase the total pillow count. Encourage concessioners to renovate existing facilities and overnight accommodations at Old Faithful to meet standards acceptable to the National Park Service.

Remove concession facilities from West Thumb in favor of further development at Grant Village. The gas station should be the first of these facilities to be phased out since its replacement is already in operation at Grant Village.

Until such time as it becomes feasible to construct overnight facilities at Grant Village, the existing parking area should be evaluated for use as a recreational-vehicle park.

Concentrate the principal overnight facilities in the Lake-Fishing Bridge area at Lake with a phasing out of the Fishing Bridge cabin area. Remove all but day-use and interpretive facilities from the Fishing Bridge complex.

Make Roosevelt the focal point for all horse-concession base-station operations. Develop unloading ramps and holding corrals at major trailheads.

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An Act To set apart a certain tract of land lying near the headwaters of the Yellowstone River as a public park, approved March 1, 1872 (17 Stat. 32)

Public park established near headwaters of Yellowstone River.

Boundaries. (R.S., sec. 2474.)

(Amended by 45 Stat. 1435, see p. 43; and 46 Stat. 220, see p. 45.)

Certain persons locating, etc., thereon, to be trespassers.

Secretary of Interior to have control of park; to make rules for its care.

(Supplemented by 59 Stat. 535, as amended. See p. 8.)

(R.S., sec. 2476.)

May grant certain leases and expend proceeds thereof.

Amended by 30 Stat. 535, as amended. See p. 8.)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the tract of land in the Territories of Montana and Wyoming, lying near the headwaters of the Yellowstone River, and described as follows, to wit, commencing at the junction of Gardiner's river with the Yellowstone river, and running east to the meridian passing ten miles to the eastward of the most eastern point of Yellowstone lake; thence south along said meridian to the parallel of latitude passing ten miles south of the most southern point of Yellowstone lake; thence west along said parallel to the meridian passing fifteen miles west of the most western point of Madison lake; thence north along said meridian to the latitude of the junction of the Yellowstone and Gardiner's rivers; thence east to the place of beginning, is hereby reserved and withdrawn from settlement, occupancy, or sale under the laws of the United States, and dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people; and all persons who shall locate or settle upon or occupy the same, or any part thereof, except as hereinafter provided, shall be considered trespassers and removed therefrom. (U.S.C., title 16, sec. 21.)

SEC. 2. That said public park shall be under the exclusive control of the Secretary of the Interior, whose duty it shall be, as soon as practicable, to make and publish such rules and regulations as he may deem necessary or proper for the care and management of the same. Such regulations shall provide for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition. The Secretary may in his discretion, grant leases for building purposes for terms not exceeding ten years, of small parcels of ground, at such places in said park as shall require the erection of buildings for the accommodation of visitors; all of the proceeds of said leases, and all other revenues that may be

derived from any source connected with said park, to be expended under his direction in the management of the same, and the construction of roads and bridle-paths therein. He shall provide against the wanton destruction of the fish and game found within said park, and against their capture or destruction for the purposes of merchandise or profit. He shall also cause all persons trespassing upon the same after the passage of this act to be removed therefrom, and generally shall be authorized to take all such measures as shall be necessary or proper to fully carry out the objects and purposes of this act. (U.S.C., title 16, sec. 22.)

Shall prevent wanton destruction of fish and game and remove trespassers.

Excerpt from "An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1884, and for other purposes," approved March 3, 1883 (22 Stat. 626)

For the protection and improvement of the Yellowstone National Park: For every purpose and object necessary for the protection, preservation, and improvement of the Yellowstone National Park, including compensation of superintendent and employees, forty thousand dollars, two thousand dollars of said amount to be paid annually to a superintendent of said park and not exceeding nine hundred dollars annually to each of ten assistants, all of whom shall be appointed by the Secretary of the Interior, and reside continuously in the park and whose duty it shall be to protect the game, timber, and objects of interest therein; the balance of the sum appropriated to be expended in the construction and improvement of suitable roads and bridges within said park, under the supervision and direction of an engineer officer detailed by the Secretary of War for that purpose.

Yellowstone National Park.

The Secretary of the Interior may lease small portions of ground in the park, not exceeding ten acres in extent for each tract, on which may be erected hotels and the necessary outbuildings, and for a period not exceeding ten years; but such lease shall not include any of the geysers or other objects of curiosity or interest in said park, or exclude the public from the free and convenient approach thereto; or include any ground within one quarter of a mile of any of the geysers, or the Yellowstone Falls, nor shall there be leased more than ten acres to any one person or corporation; nor shall any hotel or other buildings be erected within the park until such lease shall be executed by the Secretary of the Interior, and all contracts, agreements, or exclusive privileges heretofore made or given in regard to said park or any part thereof, are hereby declared to be invalid; nor shall the Secretary of the Interior, in any lease which he may make and execute, grant any exclusive privileges within said park, except upon the ground leased.

Lease of grounds; conditions. (Repealed by 28 Stat. 222. See p. 34.)

The Secretary of War, upon the request of the Secretary of the Interior, is hereby authorized and directed to

Detail of troops, etc., for protection of park.

APPENDIX A

Land Classification

Park lands shall be classified to designate where various strategies for management and use will best fulfill management objectives and achieve the purpose of the park. Such classification will be based on the inherent nature of park resources and the suitability of the land for the proposed uses and management.

Four general zones will be recognized--natural, historic, development and special use. Within this framework, special subzones may be designated for any park where desirable to indicate in greater detail how the land or water will be managed.

Land classifications in existing master plans shall remain valid until revised or superseded.

I. Natural Zone - The natural zone is composed of one or more subzones. In these subzones, natural resources and processes remain largely unaltered by human activity except for approved developments essential for management, use and appreciation of the park. Developments will be minimal or absent in certain subzones (wilderness-or wilderness study-subzone); in others (natural environment subzone) park roads, dispersed recreation facilities such as picnic areas and interpretive facilities are permissible. Natural zones and identical subzones in different parks will be managed under the same policies regardless of management category except where legal requirements and valid existing rights require exceptions.

Examples of natural subzones include:

- A. Wilderness (or wilderness study) subzone. Lands and waters legislatively designated as wilderness, or those which are being considered for wilderness. They are managed to protect wilderness values in accordance with wilderness management policies.
- B. Environmental protection subzone. Lands and waters possessing particular value as wildlife habitat and/or for research. They are managed to perpetuate ecological values without, or with minimal, human intrusion in accordance with the park's resources management plan.
- C. Outstanding natural feature subzone. Geological and biological features possessing unusual intrinsic value or uniqueness. These features often are the park's principal attractions and are managed to provide for visitor enjoyment without impairing their quality.
- D. Natural environment subzone. Natural environments not suitable or desirable for classification in other subzones. They are lands that may be managed to provide for environmentally compatible recreational activities based upon and protective of the natural environment.

II. Historic Zone - This zone includes all lands containing resources listed on or eligible for the National Register of Historic Places. Designation of historic zones shall occur not later than the date the resources are nominated to the National Register and shall be reflected in the park's land classification plan. In most cases, boundaries of historic zones shall be identical with the boundaries of properties nominated to the National Register and shall include sufficient land for the protection and public appreciation of cultural resources and their settings. Any reclassification or partial reclassification of existing historic zones to other zones (or alienation of historic zone land) shall require compliance with the Procedures for the Protection of Historic and Cultural Properties promulgated by the Advisory Council on Historic Preservation under the National Historic Preservation Act of 1966 and Executive Order 11593 (36 C.F.R. Pt. 800).

Certain lands not meeting the criteria for listing on the National Register may be designated as historic zones. Such cases would include local cemeteries and other minor historic sites worthy of protection and interpretation.

Physical development in historic zones shall be the minimum needed to preserve, protect, and interpret historical, cultural, or archeological values. It shall not detract from or adversely affect these values, except as determined to be unavoidable, through compliance with the Advisory Council's Procedures for the Protection of Historic and Cultural Properties. Activities in historic zones generally shall be limited to sightseeing and the study of the cultural features. However, this limitation shall not preclude appropriate adaptive use of historic structures for utilitarian purposes or other uses permitted in these policies.

III. Development Zone - This zone includes lands and waters where nonhistoric park development and intensive use, existing and proposed, do or may substantially alter the natural environment. This zone is managed to provide and maintain development that serves the needs of park management and relatively large numbers of visitors. Aggregations of buildings, parking lots, service roads, and utilities will be included in this zone. Park roads extending beyond a development center will be included in the natural, historic, or special use zone through which they pass. Developments permitted in other zones do not constitute a development zone. Development zones shall be restricted to the smallest area necessary to accommodate existing or proposed development and use. Development zones are designated only after considering alternative sites (including out of the park) and alternative levels of use, management facilities, and services necessary to achieve park objectives.

IV. Special Use Zone - Special uses of lands and waters not permitted in natural, historic or development zones are included in this category, mostly in recreation areas. Examples of possible subzones include the following:

- A. Reservoir subzone. Major reservoirs and adjacent lands to the high water mark where the National Park Service does not have exclusive

management authority. Minor developments, such as launching ramps and beaches, will be included. Minor foundations not subject to drawdown may be classified in other zones.

- B. Landscape management subzone. Nonhistoric lands where artificial manipulation creates a managed landscape that must be maintained through intensive management.
- C. Private development subzone. Non-Federal lands and waters within park boundaries, including inholdings subject to fee acquisition; lands in certain recreation areas that are exempt from fee acquisition so long as they are developed according to Federal zoning standards exempt from fee acquisition; and lands affected by federally-owned scenic easements. This subzone does not apply to lands that are legally exempt from acquisition such as the private communities at Cape Hatteras.
- D. Resource utilization subzone. Lands and waters where utilization or removal of nonrenewable environmental resources is legally sanctioned. Mining is an example. Lands supporting consumptive use of renewable resources, as in grazing operations, should be classified in other appropriate zones.

DRAFT

STATEMENT FOR MANAGEMENT

YELLOWSTONE NATIONAL PARK

WYOMING, MONTANA, IDAHO

Prepared By: Robert C. Haraden Date 12-5-75
Superintendent

Preliminary Approval: [Signature] 1/16/76

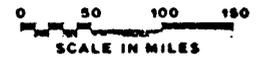
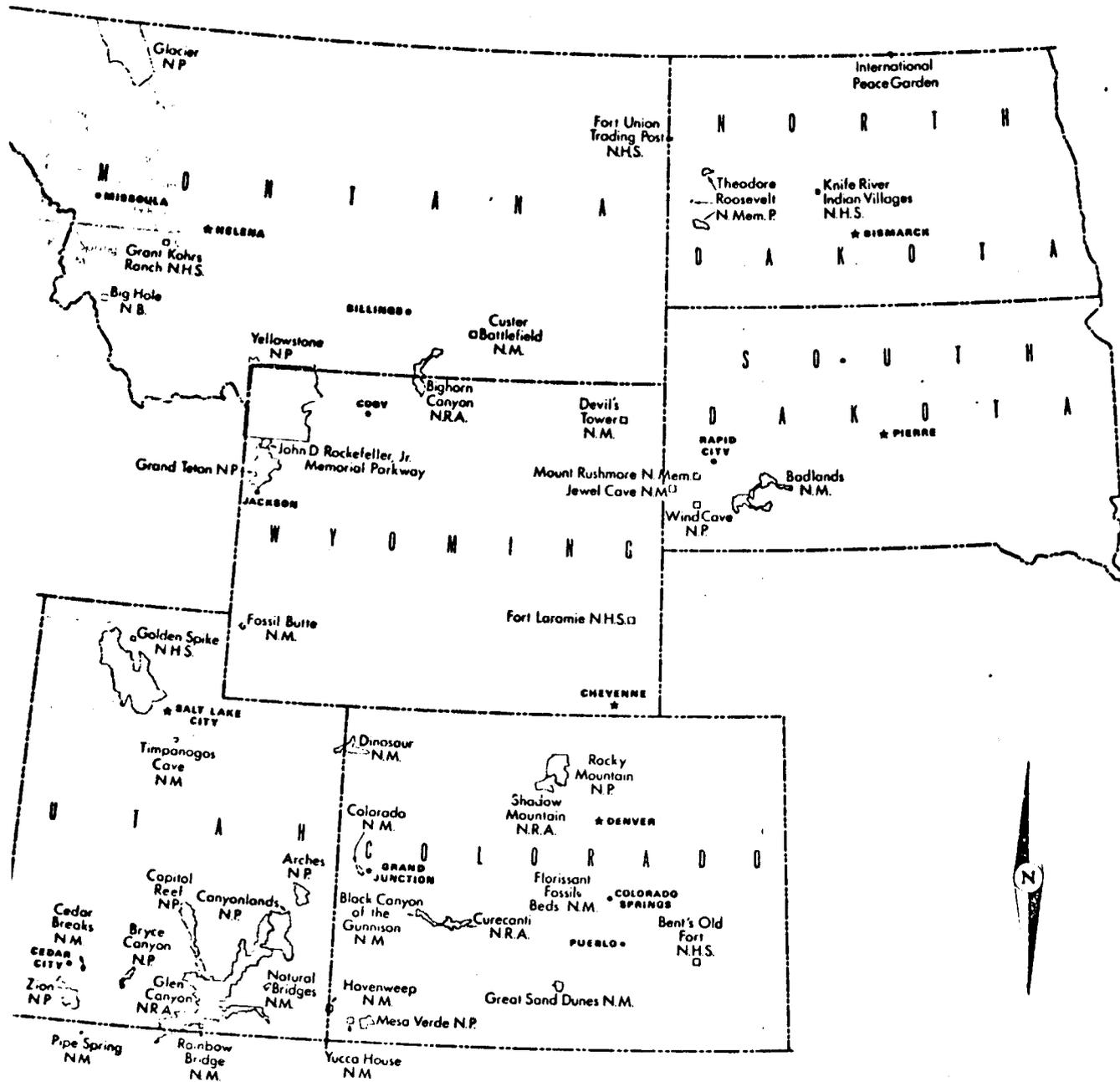
WASO Policy Review: _____ Date _____

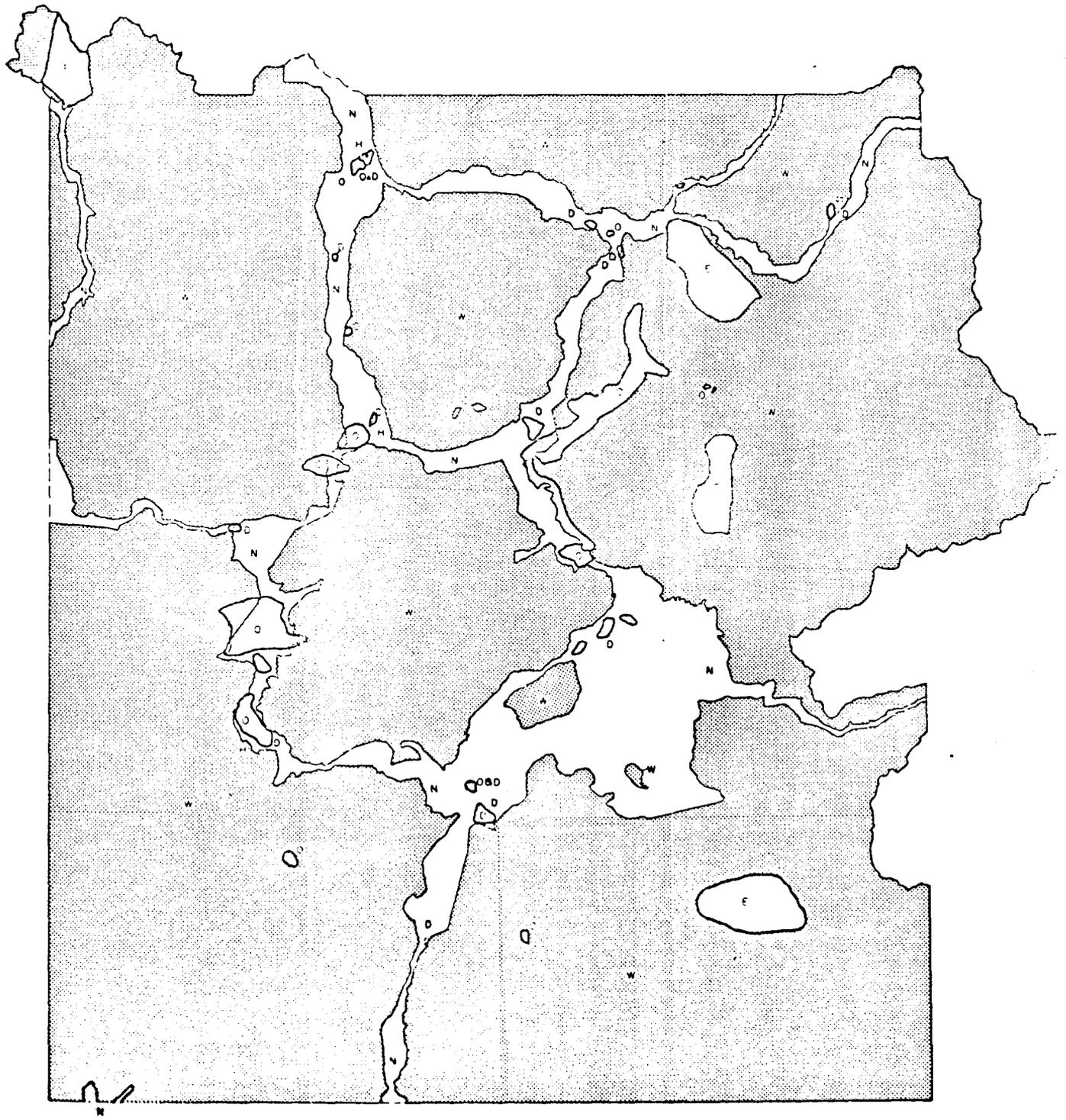
Final Approval: _____ Date _____

ROCKY MOUNTAIN REGION
 NATIONAL PARK SERVICE
 UNITED STATES DEPARTMENT
 OF THE INTERIOR

LEGEND

- Locations of Major Cities
- * Locations of State Capitals
- State Boundary Lines
- National Park Service Areas

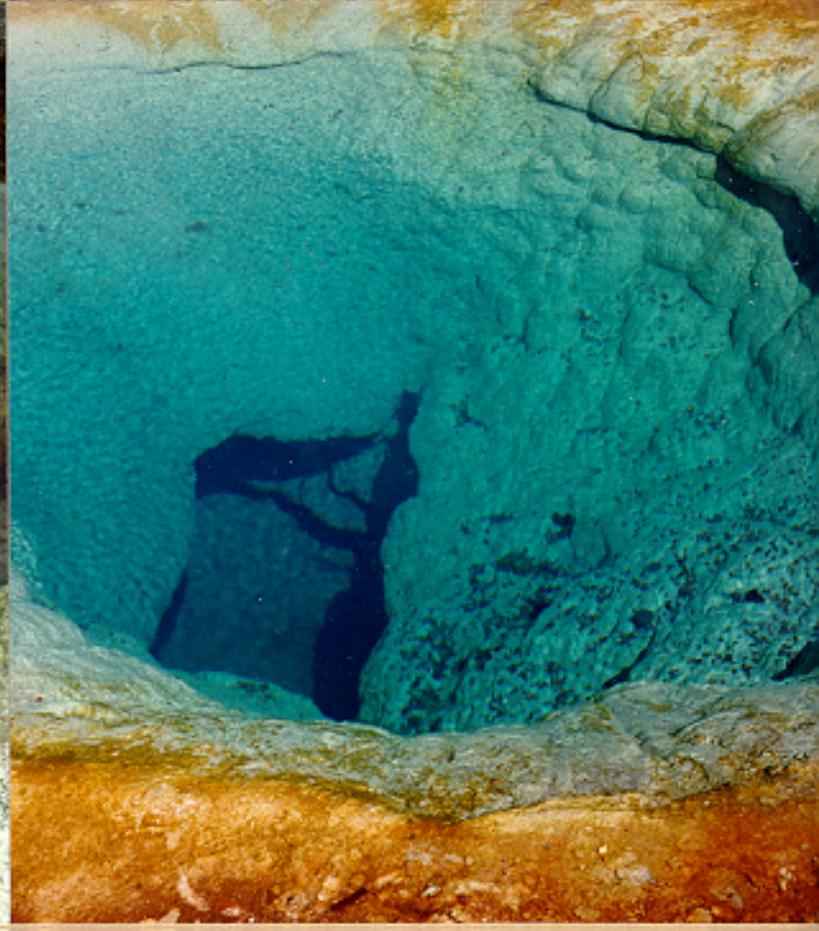




YELLOWSTONE LAND CLASSIFICATION PLAN

- LEGEND
- (stippled) 11.00
 - (diagonal lines) 12.00
 - (horizontal lines) 13.00
 - (vertical lines) 14.00
 - (cross-hatch) 15.00
 - (dots) 16.00
 - (white) 17.00







UNITED STATES OF AMERICA

NAME Yellowstone National Park

IUCN MANAGEMENT CATEGORY II (National Park)

IX (Biosphere Reserve)

X (World Heritage Site - Criteria: i, ii, iii, iv)

BIOGEOGRAPHICAL PROVINCE 1.19.12 (Rocky Mountains)

GEOGRAPHICAL LOCATION In the southern portion of the northern Rocky Mountains, in the north-west corner of the state of Wyoming, overlapping into Montana on the north and Idaho on the west. The eastern boundary mostly follows topographic divides but the remaining boundaries are defined by compass lines. 44°08'-45°07'N, 109°10'-111°10'W

DATE AND HISTORY OF ESTABLISHMENT Created a national park on 1 March 1872; accepted as a biosphere reserve in June 1976; and accepted as a World Heritage site in 1978. Protection is provided under several congressional acts.

AREA The biosphere reserve covers an area of 898,349ha (824,263ha in Wyoming, 61,144ha in Montana and 12,743ha in Idaho). It is surrounded by wilderness and wildlands in six national forests and Grand Teton National Park to the south, plus two national wildlife refuges. Taken together, these areas make up the greater Yellowstone area, considered the largest intact ecosystem in the temperate zone of the earth, four times the size of the park alone.

LAND TENURE Federal government, except for 7.7ha

ALTITUDE 1,710-3,463m

PHYSICAL FEATURES The park is part of the most seismically active region of the Rocky Mountains, a volcanic "hot spot". The Yellowstone Plateau, now a forested area of 650,000ha with an average elevation of 2,000m, was formed out of the accumulation of rhyolite. The plateau is flanked on the north, east and south by mountains that rise to 4,000m. Crustal uplifts 65 million years ago raised blocks of crust to form the southern Rocky Mountains. After that, volcanic outflows of andesitic composition were common to about 40 million years ago. Andesitic ashflows and mudflows of Eocene age covered forests that became petrified. Nearly 200 species of petrified plants have been found. A more recent period of rhyolitic volcanism began in the region about two million years ago, during which time thousands of cu.km of rhyolitic magma filled immense chambers under the plateau, and then erupted to the surface. Three cycles of eruption, dated at 2.2 million years ago, 1.2 million years and

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600,000 years ago, produced huge explosive outbursts of ash. The latest eruptive cycle formed a caldera 45km wide and 75km long, when the active magma chambers erupted and collapsed. The crystallising magma is the source of heat for hydrothermal features such as geysers, hot springs, mud pots and fumaroles. Yellowstone contains more geysers than all the rest of the world combined, with 200-250 active geysers, and perhaps 10,000 thermal features in total. Most of the area was glaciated during the Pleistocene, and many glacial features remain. The park lies at the headwaters of three major rivers. Yellowstone River is a major tributary of the Missouri River that flows via the Mississippi to the Gulf of Mexico. Firehole and Gibbon rivers unite to form Madison River that also joins the Missouri. Snake River arises near the park's south boundary and joins the Columbia to flow into the Pacific Ocean. Yellowstone Lake (37,127ha) with a maximum known depth of 119m, is the largest lake at high elevation (2,357m) in North America. Lower Yellowstone Falls (94m) is the highest of more than 40 named waterfalls in the park.

CLIMATE Precipitation ranges from 258mm at Gardiner to an estimated 2000mm in the south-west, falling mainly as snow. Temperatures range from a January mean of -12°C to a July mean of 13°C at Lake Yellowstone.

VEGETATION The park is 80% forested, and 80% of that is dominated by lodgepole pine Pinus contorta. Great elevational differences produce a range of plant communities, from semi-arid steppe to alpine tundra. Seven species of coniferous trees and nearly 1,100 species of vascular plants grow in the park. One grass Agrostis rossae is endemic. The thermal areas contain unique assemblages of thermal algae and bacteria.

FAUNA Six species of ungulates are native to the park. In order of abundance they are elk Cervus elaphus (numbering 3,172 in 1968, 12,607 in 1975, 10-12,000 in the early 1980s and 19,000 in January 1988), mule deer Odocoileus hemionus, bison Bison bison (occurring in three herds and currently numbering 2,700 animals), moose Alces alces, bighorn sheep Ovis canadensis, pronghorn Antilocapra americana, and white-tailed deer Odocoileus virginianus. Grizzly bear Ursus arctos has been the subject of intensive study and management for 30 years. Its recovery has been of highest priority in the greater Yellowstone ecosystem since it was listed as endangered in 1973, and the National Park Service has striven to minimise contact between park visitors and bears. There are currently some 50 breeding females and 150 cubs have been born in the last three years. A minimum of 200 bears roam the 3,890ha recovery area. Other species of interest are the endangered bald eagle Haliaeetus leucocephalus, endangered peregrine falcon Falco peregrinus, and trumpeter swan Cygnus buccinator. Mountain lion Felis concolor are under study. Some 15-22 occupy the study area in the northern part of the park.

Grey wolf Canis lupus was native, but was extirpated by 1927 when national policy was to eliminate wolves from all public lands. However, there are plans to reintroduce the species into a core area in the park (Bishop, 1987). Native fishes, such as Yellowstone cut-throat trout Oncorhynchus clarki bouvieri and Arctic grayling Thymallus arcticus, are protected by regulations that also permit taking of non-native introduced species. Palaeontological study of Lamar Cave has yielded remains of over 30 species of mammals. This suggests a diversity of fauna in prehistoric times much like that found in Yellowstone to-day. Elk were found in six out of nine levels above and below a layer radiocarbon dated at 960 before present. Gray wolf bones were found below the 960 BP layer.

CULTURAL HERITAGE Archaeological investigations of numerous important sites show humans visited the park area for 10,000 years, but no group made it a permanent home. A cultural resources plan will be integrated with the natural resources management plan.

LOCAL HUMAN POPULATION A permanent community of about 300 people associated with park operations is located at Mammoth Hot Springs, the park headquarters. Smaller groups are stationed throughout the park at ten other locations.

VISITORS AND VISITOR FACILITIES A road system of 600km provides access to major features. Six major developed areas offer food, lodging, camping, and a recreational vehicle park. Eighty-five trailheads provide access to 1,930km of trails and 300 backcountry campsites. Annual visitation in recent years has been about 2.5 million. In winter, most roads are groomed as snowmobile trails.

SCIENTIFIC RESEARCH AND FACILITIES A resident research staff of 17 permanent and 40 seasonal employees studies large mammals, fisheries, vegetation, fire ecology and geology, assisting park management and interpretation. Another 200 independent researchers work in the park annually. Research projects requiring a natural environment or those orientated to management are given preference. Research requiring modification of the biota or environment is not permitted. The large area where natural processes are allowed to operate makes the park an excellent area for research on natural processes. Limited laboratory space is available. Access to backcountry is normally limited to non-mechanised means. The University of Wyoming - National Park Service Research Center, funded and administered jointly by the NPS and University of Wyoming, sponsors research in national parks in Wyoming, Montana, Idaho, South Dakota, Utah and Colorado.

CONSERVATION MANAGEMENT A master plan (1973), statement for management (1986), a natural resources management plan (1983), a

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land protection plan (1986), and an exotic vegetation management plan (1986) are among the documents that guide conservation of park resources. A Fire Management Plan was inaugurated in 1972, with 137,700ha designated as appropriate for natural fires. Revised in 1986, further revisions are proposed following the major fires of 1988. Interagency guidelines are followed for grizzly bear management. Cooperative interagency teams direct research and management of grizzly bears, ungulates, peregrine falcons, bald eagles and trumpeter swans in the greater Yellowstone area. Hunting, logging, mining, and domestic livestock grazing are prohibited. Regulated fishing and camping are allowed. There are three defined management zones: natural, 897,656ha; historic, 32ha; and development, 810ha.

MANAGEMENT CONSTRAINTS Grizzly bear recovery has been the dominant resource issue in the greater Yellowstone area for nearly 20 years. It has promoted an unprecedented level of interagency cooperation and public controversy. The park's bison are the only wild, continuously free-ranging bison in the United States. Winter weather is allowed to naturally regulate their numbers in the park, but their tendency to recolonise lands outside the park has led to large-scale control hunts north of the park. The winter range of the northern Yellowstone elk herd has been under study for at least three decades. Assuming overstocking and overgrazing, elk were trapped and translocated to restock other ranges and reduced by ranger shooting until 1968. Since then, the park has experimented with natural regulation, coupled with continuous monitoring and range studies. Commercial and private development north of the park may threaten the isolated pronghorn population. Several species of fish have been introduced, brook trout Salvelinus fontinalis, lake trout S. namycush, brown trout Salmo trutta and lake chub Couecius plumbeus. Rainbows and browns replaced cut-throat trout Salmo clarki and grayling Thymalius arcticus in much of the Madison River drainage. Lake and brown trout have severely affected Snake River fine-spotted cut-throat. Surface mining, oil and gas exploration and extraction, and development of geothermal resources near park boundaries potentially threaten park air and water quality and visual integrity. They also threaten critical habitat for grizzly bears. Fire suppression on the northern Yellowstone elk winter range for 100 years, and throughout the forested part of the park for about 40 years, was a departure from natural conditions. In 1988 a major uncontrolled fire occurred, and a total of 558,900ha in the Greater Yellowstone Area experienced fire to some degree, including 402,975ha within the park. Of the latter, 232,065ha were canopy burn, 148,600ha were surface burn, wherein most trees will have survived, and 22,000ha of meadows and sage/grasslands burnt. Despite the ferocity of the fire, losses of large mammals were light. A total of 25,000 personnel was involved at various times in fire fighting and a cost of some US\$112 million was incurred. The 1987 Northern Rocky Mountain Wolf Recovery Plan calls for

restoration of grey wolf to the park.

STAFF Permanent staff of 307: 13 assigned to the Superintendent's office; 44 to administration; 88 to resource management and visitor protection; 123 to maintenance; five to concessions management; 17 to research, and 17 to interpretation. In summer, the staff is supplemented by 511 seasonal employees, bringing the total to 818 maximum. Another 130 permanent and 3,900 seasonal employees operate three concessions to provide food, lodging and other services.

BUDGET US\$ 16,848,700 budgeted for fiscal year 1989

LOCAL ADDRESSES

Superintendent, National Park Service, PO Box 168, Yellowstone National Park, Wyoming 82190

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DATE 1980, revised August 1986, October 1989, May 1990